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STEEL

ESTABLISHED 1882

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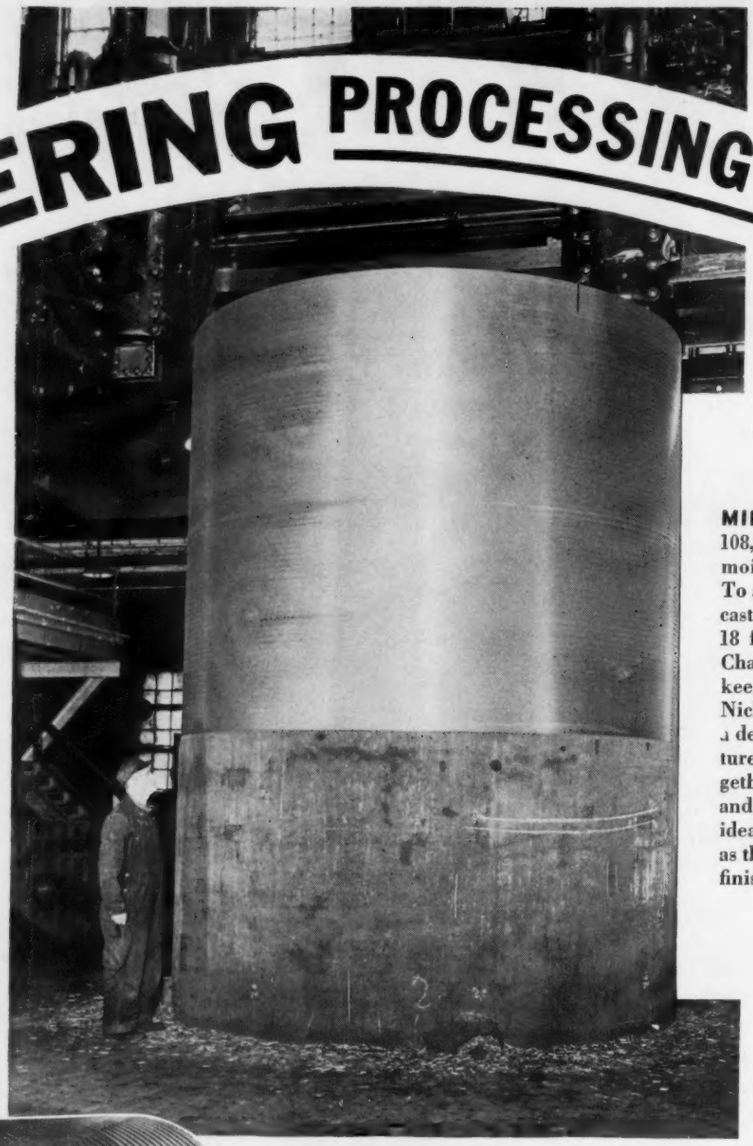
PRODUCTION • PROCESSING • DISTRIBUTION • USE

LOWERING PROCESSING COSTS

...on GOLD, SEWAGE *and* PAPER PULP

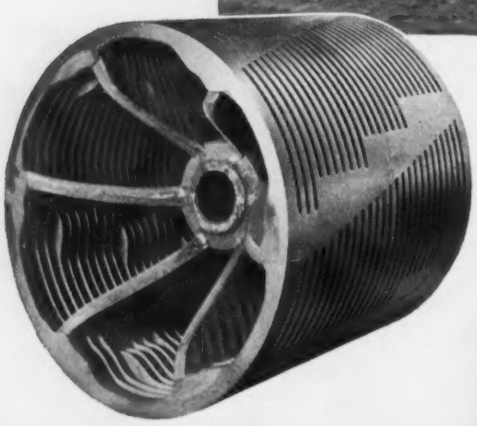
...with NICKEL CAST IRONS



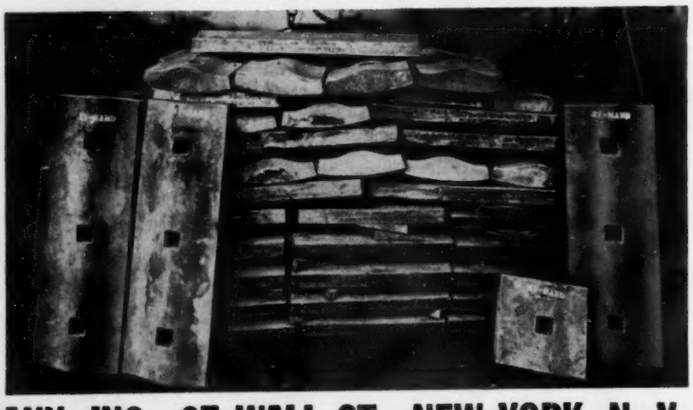
MIRROR-SMOOTH this 108,000 lb. drier shell presses moisture from paper pulp. To assure uniformity in this casting, 12 ft. in diameter and 18 ft. overall length, Allis-Chalmers Mfg. Co., Milwaukee, added 1% Nickel. This Nickel cast iron developed a dense, close-grained structure throughout, which, together with its uniformity and machinability, makes it ideal for such applications as this, where a very smooth finish is required.

*Ni-Resist—Reg. U. S. Pat. Off. by The International Nickel Company, Inc. — #278,180

*Ni-Hard—Reg. U. S. Pat. Off. by The International Nickel Company, Inc. — #281,986



GOLD MINE "IN THE BLACK." Even in gold mines, operating costs must be kept down. Ball mill liner costs were *halved* when the Wendigo mine in Kenora, Ontario, used Ni-Hard,* an exceptionally hard and wear resistant Nickel cast iron, for liners in their ore grinding mill. These liners, cast by the Vulcan Iron Works, Winnipeg, handled more than *twice* the tonnage reached by previous liners of an unalloyed material. Reduce processing costs by specifying Nickel cast irons for hard jobs in your plant. For practical information about money-saving applications of Nickel alloyed materials in your industry, please write to the address below.



LASTS 10 TIMES LONGER. In one service test, Ni-Resist,* the special corrosion-resistant Nickel cast iron, withstood acids and organic compounds encountered in raw sewage 10 times longer than plain iron. To cut processing costs in modern sewage disposal plants, this Comminutor grinder shell is cast from Ni-Resist for the Chicago Pump Co. These precision castings, which withstand abrasive wear stoutly as they do corrosion, were produced by the Challenge Foundry Co., Batavia, Illinois.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

STEEL
PRODUCTION • PROCESSING • DISTRIBUTION • USE

As the Editor Views the News

■ STEEL demand is moderately better in some directions and releases against orders for flat-rolled material are increasing. Production last week again moved up (p. 31) to 53.5 per cent of ingot capacity. Immediate further gains are not likely to be impressive, particularly because consumption by the automobile industry (p. 83) is to be light over the next few weeks. Termination of the Briggs strike temporarily smooths the Detroit labor situation; there is a possibility of union demands on automotive companies. In the meantime tool and die work for 1940 models has been resumed. Prices in some instances are not entirely firm; plate quotations are being shaded and official levels on sheets have not yet been firmly established. Scrap prices are up slightly.

♦ ♦ ♦

Presents Steel's Case

House sentiment grows that, in the absence of Wagner act revision at this session, the resolution to investigate the national labor relations board should be passed. The American Iron and Steel institute, through its executive secretary, Walter S. Tower, last week (p. 34) presented recommendations for a number of changes in the act. The President has signed the act authorizing expenditure of $100,000,000 over a 4-year period for the purchase of strategic materials which this country must obtain largely from abroad; no actual appropriation, however (p. 36), yet has been made. . . . Our exports of aeronautical products continue to gain, with Great Britain and France our best customers; Germany and Italy (p. 37) are gaining in South America.

♦ ♦ ♦

Modernized Industry

Modernization and improvement in the steel industry will continue, but along different lines, as a result of the industry's current financial condition. Emphasis now is on low-cost mills with lower speeds and lower overhead charges than the high-speed continuous mills that have been built in recent years. Research work is being intensified in various directions. The bessemer process seems likely to gain wider adoption. These are some conclusions by Robert L. Hartford, STEEL's Pittsburgh editor, as to economic trends in the steel industry. . . . Republic Steel Corp. (p. 31) will rebuild and enlarge its blast furnace at Warren, O. . . . Important changes are to be made by the American Society for Testing Materials (p. 54) in the publication of its standards.

♦ ♦ ♦

Continuous Tinning

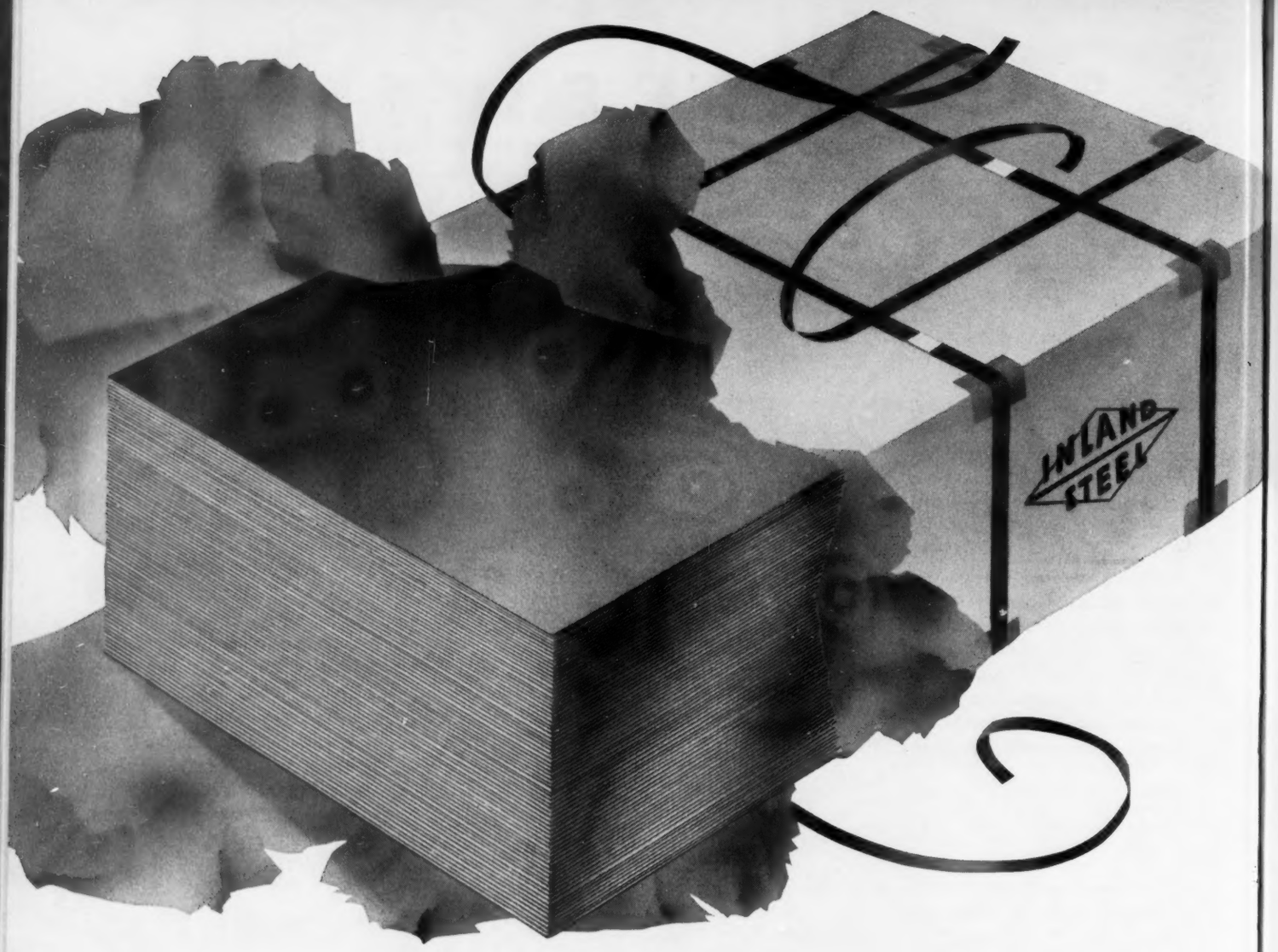
A pioneer researcher in continuous electrotinning of wide strip steel believes that this development now is ready for application to large-scale, commercial production (p. 56) of high-grade tin plate. . . . Appearance is gaining as a key factor in machine tool marketing, according to STEEL's machine tool editor, Guy Hubbard (p. 46). The machine tool industry can sell most effectively on the basis of "profit engineering," it was stated (p. 27) at the spring convention of the Associated Machine Tool Dealers of America. . . . A ⅛-horsepower gasoline engine is used to drive model airplanes and boats; it weighs 3¾ ounces (p. 48) and has speeds from 1000 to 8000 revolutions per minute. . . . Gage blocks now have chromium plated surfaces (p. 62), with resulting longer life.

♦ ♦ ♦

Fusion Welding

Fusion welding of galvanized material need not cause increased corrosion if properly done; certain factors must be observed (p. 50) if a satisfactory job is to be obtained. . . . Many possible materials handling improvements are ignored due to erroneous impressions that the resulting savings would be negligible. In one such case (p. 52), involving motor brush assemblies and miscellaneous items, good results were obtained from use of fork trucks and pallets. . . . Addition of a small amount of silver makes chromium-nickel stainless steel more resistant to sea water pitting and (p. 58) reduces work hardening, improves machinability, thermal conductivity and polishing characteristics. . . . Steel is consumed in unusual quantities in a new type house (p. 64) in California.

E C Kreutzberg



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SHEETS STRIP TIN PLATE BARS PLATES FLOOR PLATES STRUCTURALS PILING RAILS TRACK ACCESSORIES REINFORCING BARS

Steel Spends Billion for Modernizing—With Net Earnings Under Half That Amount

Capacity Far Ahead of Requirements, Yet Technical Progress Spurs Improvement—New Trends Sighted if Financial Resources Continue To Decline

By R. L. HARTFORD
Pittsburgh Editor, STEEL

■ TECHNICAL progress and the competitive situation have been far more important factors in determining when and how money should be spent for expansion and modernization in the steel industry than business conditions. Experience shows the mere fact business is not particularly active does not hold up new mill construction. Of course, a period of extreme depression such as experienced in 1932-33 necessitates retrenchment for several reasons, not the least of which is the fact capital is scarce for financing major improvements.

Now a slightly different trend is noted. Technological factors still are most important in determining which way the industry will turn, and are becoming even more important. However, the industry's ability to spend, though still good, has declined in recent years and this change in financial conditions has started developments along a new path.

A glance at the figures showing the steel industry's large building program demonstrates why the term "shoddy industry" cannot be applied. Production facilities cannot be allowed to run down, because of the tremendously high rate of obsolescence due to constant technological progress.

Few steel mills in this country have been scrapped because their equipment is no longer capable of steelmaking; rather they lose out because the equipment cannot keep up with mills embodying new technical developments. Their "seven-league boots" are decrepit compared with the 70-league models just installed in the new mill across the way.

This progress has not been confined to those parts of the industry where new processes have outmoded the old. Production equipment in many processes has undergone little radical change, yet there has been a constant flow of refinement and reconstruction here, too. For example, in the open hearth itself the theory of steelmaking has not changed fundamentally, but new devices have brought closer controls; new refractories, more even temperatures; new heating methods, greater fuel economy. This changing picture has resulted in a constant stream of new open-hearth construction.

Product Uses Expanded

Another important reason why the industry cannot let production facilities grow old is the fact that not only do these technological changes make production more economical, but they improve the product's quality to such a degree that many new uses have been developed.

To keep in the picture and to profit from new uses, the steelmaker must install equipment to produce the required product. A prime example of this is the increasing use of steel in automobile bodies as result of improved deep drawing qualities of sheets.

Considerable of the money spent for new equipment and modernization has gone into better research facilities. Within the past year, despite the recession, two major steel companies have completed extensive new research facilities, and a third has an elaborate program under way. Such laboratories are constantly bringing refinements and improvements in existing products, as well as developing new products to fit customers' needs.

Table I shows the number of new rolling mills completed each year for the past 20 years. Although the outline of the depression may be noted in the figures, it also is obvious that in the past few years construction has rebounded to near the 1928 level, with the added factor that modern mills surpass those of 1928 in capacity and in quality of product.

Although 1938 was one of the industry's poorest years, and so far 1939 earnings are relatively low, there has been considerable volume of building. At the first of this year 13 mills were under construction for five companies, while plans for new work have since

been announced by several more units. Total bill for the year on projects already announced is estimated at $126,000,000.

In the years 1934-1939 the bill for modernization—including new construction and equipment—amounts to $1,000,000,000. For the years 1934-1938, inclusive, net earnings of the industry totaled about $409,000,000.

These figures show beyond question the industry is not being "milked" at the expense of production facilities. Modernization and improvement of both products and competitive position come before dividends.

Also, there is no question but that the margin of cash available for modernization is growing smaller and it is becoming more difficult each year to finance improvements. This is due to two factors: Continuation of depression levels in the industry, and federal tax laws which make it difficult to accumulate surpluses in good times.

A few balance sheet ratios will show how the relative financial position of the industry has been declining. Normally these ratios would climb with increases in business, but an analysis of the figures for 12 major steel companies for the years 1934-1937, inclusive, when the trend was continually upward, shows the "current ratio" has declined in each year. This means current assets, including cash, securities, receivables and inventories, have lost in relative position to current liabilities, which include wages, taxes and short term notes. From the excellent position of 6.66:1 in 1934, the current ratio declined to 4.19:1 in 1937.

Latter ratio, of course, indicates the industry is far from a poor financial position, but on the other hand, although operations moved up steadily during that period, it is in a much less satisfactory position than in 1934, immediately following several years of declining business. Lowest ratio among the major companies at the close of 1937 was 2.66:1.

Long-Term Debt Growing

Long-term debt has increased 30 per cent with regard to fixed assets over the same period. In 1934, bonds, mortgages, and other long term obligations amounted to 19 per cent of the fixed assets. By 1937 this had climbed to 24 per cent.

Ratio between net worth and total debt indicates to what extent the stockholders' equity is liable to the claims of creditors. Combined figures for the 12 companies reveal the stockholders' position was weakened from 1934 to 1937, although the latter year reversed the trend. The ratio showed $4.89 net worth to every dollar of debt in 1934; 4.11 to 1 in 1935; 3.32 to 1 in 1936; and 3.50 to 1 in 1937.

These ratios show that while the industry still is in fairly good financial position, the trend is downward and under the present surtax system, even in good times it will be difficult for the individual corporation to set aside enough surplus to carry on the continual modernization which is so vital.

It is, therefore, becoming an increasingly weighty problem for steel management to decide matters of expansion. Financial avenues still are open and expansion and modernization continue at a fairly good rate. Present indications, however, are that future work will be along different lines. Growing pains accompanying introduction of the continuous mill are about over. Where, then, will the industry move next?

Rolling Mills Completed

TABLE I

1919	50	1929	97
1920	241	1930	94
1921	185	1931	33
1922	46	1932	21
1923	171	1933	20
1924	67	1934	21
1925	93	1935	39
1926	115	1936	51
1927	57	1937	55
1928	53	1938	50

Unless there are revolutionary new discoveries in the near future which will outmode today's processes, it is believed future programs will be limited to improving present facilities, with the exception of mills now being built or soon to be built in order to take advantage of the changing economic structure.

Factors causing latter type of expansion include industrial development in the South and elimination of basing point differentials. By and large, however, there is enough capacity at present to care for the country's needs under normal or even boom times.

A study of the figures discloses ingot capacity to be ample. Heaviest ingot production was in 1929, when 56,433,473 tons were poured. Current estimates of ingot capacity are based on 71,191,994 gross tons of open-hearth and bessemer steel, or about 25 per cent above the highest production to date. This condition is reflected in the decline in new open-hearth capacity in recent years as shown in table II.

Same is true of pig iron capacity, where the peak year of 1929 produced 41,757,215 tons, while current capacity is 51,401,480 tons.

In rolling mill capacity the margin is not so wide for all products, although total capacity for hot-rolled products is 57,389,000 gross tons—ample margin above the highest total tonnage rolled, 41,069,416 tons in 1929.

However, as regards individual products the situation is different. Rail capacity is now 2,993,000 gross tons, while in 1926, peak rail year, 3,217,649 tons were rolled. Structural capacity is now 5,062,850 tons, while the peak year produced 4,778,020.

Flat-rolled steel, on the other hand, shows a tremendous increase in capacity against increased volume. Heaviest tonnage in sheet and strip, for example, was reached in 1937 with 12,828,000 gross tons. Capacity for these products has moved up to 19,856,950 gross tons, or 55 per cent above peak production. Increased emphasis on cold-rolled sheet capacity resulting from heavier demand for the cold-rolled products is shown by the increase in the three years 1936-38, inclusive, of 50 per cent to 1,691,600 tons capacity.

However, there is always considerable obsolescence and in a good portion of the listed active capacities there are mills which the management recognizes must make way for newer units in the near future.

The big problem now facing management is to find the most efficient way to replace such obsolescence under today's capital conditions and without further endangering financial standing. We have seen how the financial position is changing; also how it is necessary to build new facilities in order to keep abreast of progress. How is management to continue operating successfully while co-ordinating these two conflicting factors?

Studying Financial Difficulties

There are several lines of thought along which the industry is progressing. The first is to cut down on the enormous expenditures due to obsolescence by building lower-cost mills, thereby reducing the tremendous depreciation charges on the large investment necessary. Changes in the tax picture as well as the financial situation have made such a course highly desirable. Of course, something must be sacrificed in such a condition; the sacrifice would have to be made in the cost of production per unit. It has been shown in operation of high speed mills that cost of higher speed moves up in greater ratio than actual increase of output. A good part of the industry is inclined to believe the higher cost of product on slower mills would be more than offset by reduction in the depreciation and other fixed costs.

Probably the most concrete approach to the problem from this angle is in the design of mills which have a lower operating speed and

which do not handle such large quantities at one time. This would reduce the size and cost of mill stands, the cost of prime movers, would ease the handling of materials and would by the same token reduce the costs of shutdowns, and the like.

Some technologists claim improved quality could be obtained on such a mill by means of reheating furnaces placed at strategic intervals through the processing to maintain the steel at most efficient rolling temperatures during the entire process. This would be feasible with smaller ingots and billets to a much greater extent than it is at present with the large quantities handled at high speeds to enable an entire rolling before the steel becomes too cold.

Such a process might also result in a better finished product and reduce costs of pickling and chipping. This could be applied to almost any finished steel product, including sheets, bar and pipe.

This angle is one result of more consultations between the metallurgist and the mill engineer. From a metallurgist's point of view it is considerably easier to build a mill which will not become obsolete in a short period than from an engineer's viewpoint, because the engineer, who has in the past designed and built the steel mill with a minimum of influence from metallurgists, has mainly been interested in turning out the largest quantity of steel in a given time with the most efficient operation of his machines.

The metallurgist, however, is now making his influence more strongly felt although there is still need for better co-operation. In the future mills probably will be built for the long trend rather than immediate efficiency, turning out more uniform products from a more flexible production line.

Elimination of "gadgets" which "date" the production unit is another consideration in order to reduce obsolescence.

Seek Operating Efficiency

A further angle which the industry is approaching now more than ever before is higher efficiency in operations. Probably the most significant single step in this direction is the turn back to the bessemer process for steelmaking.

The open-hearth process is one of the most wasteful heating processes known. It is widely used because of its convenience and ease of control, as well as its ability to use scrap as efficiently as other materials. However, from the fuel angle it is one of the most expensive.

The bessemer process, on the other hand, is one of the most efficient, but has been displaced by the open hearth because it has been difficult to control closely and scrap cannot be used to any extent.

Several major companies have appropriated considerable money for research on the bessemer process, and the trend in the open hearth-bessemer ratio may be reversed. This will be especially true if one of the several lines now being carried out toward the perfection of an efficient melting furnace for scrap is successful.

Closer control of the bessemer through the use of photoelectric cells is another line along which research has been heading, and some attempts are reported successful.

A majority of the current problems on which research is now going forward are long-trend developments and have little or no bearing on the immediate factors confronting the industry. Among these are the ever-present direct rolling process and the various methods of by-passing the blast furnace in direct production of steel.

Uniformity of quality is dominating all research, both on immediate work and on long-term projects, and a constant study is being made of the variables in every process of steelmaking and treating, as well as in the mechanical working, in order to tie into a standard process all the possible variations which now produce differences in quality between one melt and another. As a result of this work, a wider application of close control will be seen in almost every stage of steelmaking. Better instruments and more knowledge of how to use them is the immediate result.

Despite the fight against obsolescence, bottlenecks will develop if demand increases greatly. These will be largely in auxiliary equipment, such as heating devices, handling equipment, and in co-ordination of the various processes. Another question mark is the availability of labor should the mills be faced with heavy tonnage requirements. Labor troubles of 1937 are still vivid in the memories of too many steel companies to be regarded lightly, and unless there is some way to provide experienced labor there will be production troubles on this score.

Transportation Shortage Seen

Another possible difficulty is shortage of transportation facilities. Railroads are operating with minimum car requirements. Any increase in demand would require more cars. Car building programs have been deferred so long that current capacity for construction is not large enough to cope with the actual number of cars needed to insure adequate transportation facilities.

Announced building programs by the roads indicate that should all the proposed cars be placed at once, the country's car building facilities would be tied up until some time in 1940. This would be true if placements were imminent, but as these placements will probably not be entirely allotted until late this year, there is little doubt that the deliveries would not be completed until some time in the last quarter of next year. Should business improve with any alacrity, there would almost certainly be a jam in the transportation picture.

However, these bottlenecks can be and will be eliminated as they arise. The fight of steel management for efficient and profitable operations in the face of new rules laid down by labor and government can be won, and is being won, through new approaches to the problem of production. Technology has created the immediate problem of obsolescence and has caused the resentment of labor, but technology can also eliminate these problems by proper study and development of the facilities already on hand, so the various elements involved—capital, labor, management and government—can each play its respective role without being dominated or overshadowed by any of the others.

Open Hearths Built

TABLE II

Year	Furnaces Completed	Added Tonnage
1913	62	3,120,000
1914	9	507,000
1915	43	1,759,000
1916	105	4,300,000
1917	102	5,413,000
1918	39	2,192,500
1919	23	1,871,000
1920	26	1,268,000
1921	13	620,000
1922	7	364,000
1923	8	535,000
1924	16	1,110,000
1925	9	630,000
1926	18	1,327,500
1927	8	515,000
1928	13	1,204,500
1929	14	1,134,700
1930	16	1,427,400
1931	34	3,068,900
1932	0	0
1933	4	246,400
1934	1	25,000
1935	1	35,000
1936	8	662,800
1937	1	85,000
1938	11	931,300

■ Battelle Memorial institute, Columbus, O., has awarded contracts for construction of a research laboratory, adding 50,000 square feet of space on five floors.

Defend Machines? It's How To Put More of Them at Work, That Counts

■ OBSTACLES which the national administration has placed in the path of business—not progress in mechanization—is holding up re-employment and employment increases. This is the opinion expressed by Wendell E. Whipp, president, Monarch Machine Tool Co., Sidney, O., and president, National Machine Tool Builders' association, in replying to a letter to STEEL (April 24, p. 9) by Charles I. Faddis, Democratic congressman from the twenty-fifth district, Pennsylvania.

Congressman Faddis wrote that although machinery has brought a great many commodities within the reach of the mass of consumers, he believes we are at present supersaturated with machinery, that putting additional machines to work will not solve our problems, and that certain machinery displaces labor merely in the interest of time. Mr. Whipp's reply:

Dear Mr. Faddis:

In your letter to STEEL which was published in the April 24 issue you put your finger directly upon what is without any question the foremost problem confronting the United States today. This country still has too many people unemployed. We must work out some means whereby more of the men who are capable of earning a living have jobs which will assure them of continuing employment at fair wages.

The objective toward which you are striving is exactly that toward which American industry is striving.

American industry, on the whole, is set up on the basis of mass markets. It can make profits only on the basis of large volume. To assure volume, there must be the broadest possible purchasing power. Mass purchasing power can come only from continuous and widespread payrolls.

Displacement Only Temporary

It follows that if business in this country is to make profits, the largest possible number of people must be employed on a basis which will permit them to spend a fair share of incomes on the products made by American industries.

The only difference between your viewpoint and ours has to do with the methods to be employed to reach our common objective.

According to your letter to STEEL, you apparently believe that modern equipment and machinery have the effect of putting men out of work. I take the liberty of saying frankly that I disagree with you as to this premise.

It is my firm belief, based upon practical experience, that increased mechanization leading toward increased productivity results always in the long run in increasing the number of men employed.

You assume that when a "labor saving" device is introduced in a certain industry, this device displaces a number of men who up until this time had been performing this particular job largely on a hand-labor basis. That does happen. It is a matter of record that in many industries modernized equipment, which enables five men to turn out the number of products formerly produced by 20 or 25, has sometimes resulted for the time being in the displacement of men hitherto employed.

More Machines, More Jobs

But it is also equally a matter of record that in the long run the sum total of employment is constantly increased by more efficient mechanization; and that in the very plants where men have been temporarily displaced by machines, employment levels have shortly thereafter passed all previous records, due to the production economies made possible by those very machines.

Where do you find records of really substantial employment increases in this country? You find them in the very industries which have been the foremost in adopting all the improvements which modern mechanization had to offer. As examples I may cite the automobile industry, the radio industry and the refrigerator industry.

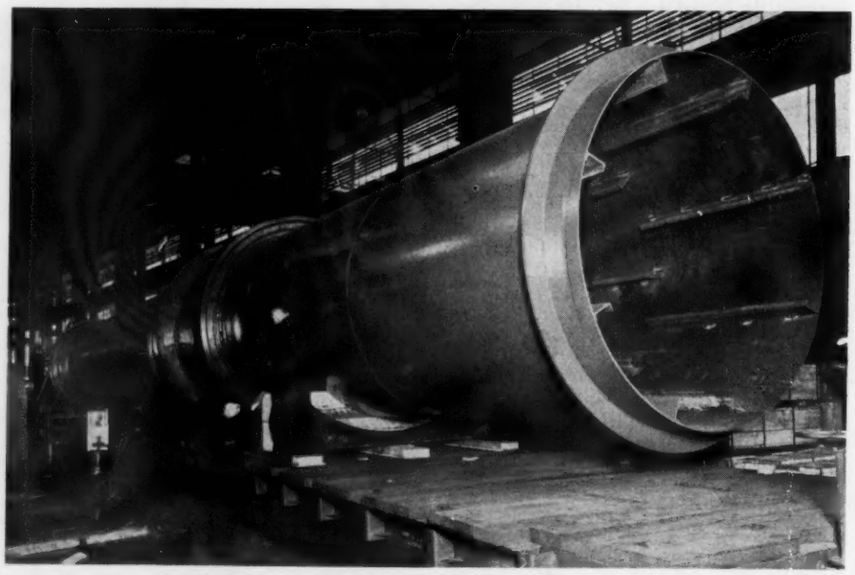
The amount of employment accounted for by these industries has been literally dependent upon the acceptance of the principle that more efficient machines make possible greater productivity, which in turn leads to lower prices, broader markets and greater volume.

Here is another illustration. In 1929, 419,000 people were employed in the steel industry. By comparison, 449,000 were employed in the steel industry during the first half of 1938. Why? The answer lies chiefly in the fact that throughout the steel industry there has been a tremendous wave of modernization of plant and equipment.

Of course, when continuous strip mills were installed a number of men formerly employed on hand sheet mills were displaced.

But the new methods made possible a reduction in price, (from about $110 per ton in 1923 to about $61.00 per ton today). This resulted in a substantial increase in demand; the total output of all finished sheets has increased from 3,078,145 tons in 1923 to 10,900,000 tons in 1937. Even in 1938 a total of 7,279,465 tons was produced. We do not know what additional employment resulted outside of the steel mills in the fabrication and sale of this great increase in sheet production, but the great majority of the men that were

Huge Rotary Cooler Shell for Oil Industry



■ This rotary cooler shell, all welded, was built recently at Allis-Chalmers Mfg. Co.'s Milwaukee plant. It weighs 110,000 pounds, is 8 feet in diameter and 100 feet long, to be used in a special processing plant serving the oil industry in the Southwest

displaced when continuous strip mills came in have found employment in other divisions of the steel industry, or in other occupations, and the sum total of people employed in the steel industry itself has definitely increased.

The same story is told by the telephone industry, which you particularly challenge in your letter to STEEL. You cite the dial phone as a typical example of mechanization which has contributed to unemployment.

The facts are these: The Ohio Bell Telephone Co., with headquarters in Cleveland, reports that in 1911 the Bell system employed 146,000 persons. This was the year in which the first steps toward dial phones were taken. Between 1911 and the present day the installation of dial phones has been a constantly progressing proposition. Today the Bell system has almost 300,000 employed, as compared to 146,000 in 1911.

Since you seem to be extraordinarily concerned about switchboard operators, it may be of interest to you to know that in 1911 the company had 73,500 women employes and today the company has 161,000 women employes.

It is my conviction that mechanization is the basic foundation of employment increases. I believe that better machinery enables the manufacturers of this country to give the people better products at lower prices—and these lower prices in turn tap a larger number of pocketbooks, and thereby produce a volume of business which gives rise to larger employment.

Remedy Lies in Washington

Now as a matter of fact, by no means as large a share of the unemployment situation is as attributable directly to industry as you apparently assume is the case. Even in the palmiest days of the "New Era" manufacturing employment never accounted for more than one-fifth of the jobs in this country. Since that time our manufacturing industries have long since reabsorbed most of that share of employment which had been theirs before the depression.

The full significance of employment increases through progressive mechanization of our industries cannot be appreciated until we also take into consideration the corresponding increases in the number of people employed in service industries. The servicing of the products of our plants employs millions. Take automobiles alone, for example. Think of the number of garage men, gasoline station attendants, and the like.

I am firmly convinced that by following the economics of improved machinery, increased productivity, and lower consumer costs, manufacturing industries, plus the servicing activities created thereby, will in the future account for a still larger proportion of the employment in this country than has been the case in the past.

Now you will ask—if these contentions are true, why is not this program today going ahead? What is holding up the re-employment and the employment increases which, in theory, result from increased mechanization?

The answer lies in the obstacles which the national administration has placed in the path of business—obstacles which tend to defer and postpone the long-term investments in plant, equipment, and machinery which must be made by manufacturers in order to achieve better mechanization.

I do not believe that the remedy for unemployment lies in attacking the machine, I believe we will find it in Washington.

Here is a program for reducing unemployment:

1. Balance the federal budget.

2. Revise the tax structure in such a way as to impose less severe penalties upon business.

3. Amend social security legislation in such a way as to cut the amounts paid by employers and employes but provide actual security instead of a "reserve" which exists only on paper.

4. Amend the Wagner act.

It is my suggestion that this program, if accomplished, would put millions of men back to work practically overnight.

Permit me to express my appreciation of the fact that you as a congressman have gone to the very root of our national dilemma, and are seeking to unravel from our national economic crazy-quilt some method of procedure and some economic philosophy which will lead toward larger and more stable employment and prosperity. The fact that you are thinking seriously and sincerely about this whole problem of employment and mechanization gives us renewed faith in the representative form of government under which this nation operates.

Electrical, Aviation Industries Seen Growing Markets for Machine Tools

■ A PLEA for closer co-operation between manufacturers, sellers and users of machine tools was made at the spring convention of the Associated Machine Tool Dealers of America at Hotel Van Curler, Schenectady, N. Y., June 5-6. This appeal was set forth by A. G. Bryant, president, Bryant Machinery & Engineering Co., Chicago, speaking in his capacity of president of the organization to the 120 members and guests in attendance.

Taking "From Builder to Salesman to User" as his topic and explaining this title as a paraphrase of the once-famous baseball double play "from Tinker to Evers to Chance," Mr. Bryant asserted: "If ever an industry needed close teamwork and ability to match co-operation with skill—as in the case of the old masters of baseball—it is the machine tool industry of today.

"Creation, application and resulting effects of machine tools are too closely related, for users, manufacturers and sales organizations to stand independently of one another.

"Who does the selling of machine tools? It may be surprising information that according to an analysis which our association has just completed, there probably are less than 1000 men engaged in the United States today in personally *contacting users* in the promotion of sale of machine tools.

"Personality will always be important; there are no substitutes for acquaintance and business friendships. But the machine tool salesman of today and tomorrow whose record is and will be outstanding, who will make the greatest contribution to his organization, to society and to himself, is the man who applies his technical knowledge and experience with diligence."

General Electric Co., Schenectady, N. Y., was host to the Dealers' organization, greetings being extended by W. R. Burrows, vice president in charge of manufacturing. Among other speakers from this company were E. D. Spicer, works manager; R. C. Muir, vice president in charge of engineering; and B. G. Tang, general superintendent.

Need Machine Tools More

Mr. Spicer stated that with skilled labor becoming increasingly scarce and expensive, the electrical manufacturing industry today needs help of the machine tool industry as never before. Mr. Muir characterized machine tool men as perennial industrial pioneers who, more perhaps than any other industrialists, must constantly "live by their wits."

"Technical developments and so-

cial development," said Mr. Muir, "have always gone hand in hand, and with 4000 people now busily engaged in our engineering departments, it is obvious that we are striving toward even better things tomorrow than are being done today. That means we must have still further machine tool developments."

Speaking of his own experience in doing business with machine tool agents, Mr. Tang made the statemen that at one time or another his company had learned so many valuable things from these agents, especially from many who are practical shop men or engineers, that the attitude of the plant management toward them can be summed up by this invitation: "Come and go in our shops as you please—almost!"

Speakers at the banquet on June 5 were John H. Van Deventer, editor, *The Iron Age*, New York, and Dr. James S. Thomas, president of both Chrysler Institute of Technology, Detroit, and Clarkson college, Potsdam, N. Y. Mr. Van Deventer dealt primarily with present-day threats to the American system of mechanization—of which he sees as: No. 1, restriction; and No. 2, socialization.

Culture Follows Prosperity

Dr. Thomas, who at the beginning of his career confined himself to classical studies, has for many years been conducting historical researches which seem to prove that every great cultural movement has been due to a boom in industry and trade, whether in ancient Greece or Rome, in Venice, in Elizabethan England or in much more modern times.

As he put it: "Whenever the profitable trade of any country flew out the window, all the philosophers and writers and other cultural elements hastily departed through the door in search of new sponsors in more prosperous places."

Dr. Thomas believes that no country ever held for its population greater cultural opportunities than does the United States today—if only our people will build on their solid industrial foundation by devoting at least a part of their free time to cultivating really worthwhile things in life.

Under the title, "Assisting in Machine Tool Sales," J. E. N. Hume, commercial vice president, industrial department, General Electric, stressed the fact that for ten years his company has been co-operating with the machine tool industry through advertising campaigns directed at machine tool users.

Ever since President Cleveland's administration, said Mr. Hume, the electrical industry has recognized the machine tool industry as a growing market. At the same time the machine tool industry has become more and more important to the electrical industry through its help on production problems until, "like the chicken and the egg," it is difficult to say which one is more important.

P. W. Brown, general superintendent, Wright Aeronautical Corp., Paterson, N. J., gave a glimpse of new horizons when he said: "The aviation industry is growing by leaps and bounds, none is more exacting and in connection with it machine tool builders have their big job yet to do."

Presents New Problems

While 5000 engines per year still is big production in this business, giving it many characteristics of a glorified job shop, certain parts such as cylinders, pistons and connecting rods, which are used in multiple, do already run into mass production quantities, Mr. Brown said. Work which must be held within 2 micro-inch profilometer readings as far as surface finish is concerned naturally does present problems to the machine tool industry, but when $1,000,000 per year machine tool programs are involved, these problems certainly are worth thinking about.

Among the guests present at the convention were a number of men prominent in the machine tool building industry. These included Wendell E. Whipp, president, Monarch Machine Tool Co., Sidney, O., who also is president of the National Machine Tool Builders' association; and Tell Berna, general manager of that association, Cleveland. Mr. Berna spoke on the subject of co-operation between builders and dealers to obtain more effective marketing to meet present day conditions.

All "Profit Engineers"

Mr. Whipp addressed the luncheon meeting on June 6 on the subject of "Profit Selling." He stated the country is full of people who need the latest machine tools, but who either don't know it or don't care, simply because the profit possibilities of these machines have not properly been presented to them by machine tool salesmen.

"Let's get away from all this talk about fine castings, ground shafts, etc., except as they may directly contribute profit to the user," he said. "We are all 'profit engineers' now. If we follow this plan consistently, the buyer who harks back to the old 'price per pound' formula will at last become extinct."

A number of inspection trips were made, the Watervliet arsenal and the American Locomotive Co. being visited on Monday afternoon, and General Electric Tuesday afternoon. Much favorable comment was made on the department at Watervliet which is devoted primarily to producing anti-aircraft guns. A large amount of new machine tool equipment recently has been installed in this part of the arsenal and its value is clearly reflected in attitude of workmen and in quality and output of work.

Ship Girders 140 Feet Long, 15½ Feet High

■ **Steel girders 139 feet, 10 inches long, 15½ feet high in center and 10 feet at ends, weighing an average of 60 tons were shipped recently from Bethlehem Steel Co.'s Pottstown, Pa., plant to Pennsylvania avenue bridge project in Washington. Each shipment comprised four girders on three cars. They were longest and heaviest loads ever transported by Pennsylvania railroad**

Activities of Steel Users, Makers

■ JOSEPH T. RYERSON & SON INC., Chicago, has purchased its Philadelphia plant property at 5200 Grays avenue, heretofore leased from Taylor-Wharton Iron & Steel Co. Extensive improvements and additions are under way which will greatly enlarge the scope of its service in the Philadelphia market.

♦

Continental Roll & Steel Foundry Co., East Chicago, Ind., has acquired Howell Engineering Co., St. Charles, Ill., which will be made a unit of its industrial equipment division. It will manufacture welded tube mill machinery, including automatic buffing and polishing equipment, under B. F. Bower patents. Engineering, service and sales staffs have been absorbed by the Continental company. H. W. Faint has been placed in charge of sales of buffing and polishing equipment for the new unit.

♦

Link-Belt Co., Chicago, announces that in broadening its line of modern power transmission equipment, it has been appointed distributor for Twin Disc friction clutches and clutch couplings by the Twin Disc Clutch Co., Racine, Wis.

♦

American Screw Co., Providence, R. I., licensor for the Phillips-type recessed head screws and bolts, is transferring its Detroit offices June 15 from 1010 Stephenson building to larger quarters at 1847 Bethune street west, where lease has been taken on the two-story building formerly occupied by Monarch Governor Co.

♦

Cleveland district offices of the Linde Air Products Co., Carbide & Carbon Chemicals Corp., and Haynes Stellite Co., all units of Union Carbide & Carbon Corp., New York, have been moved to 1517 Superior avenue. District managers are H. H. Dyar, Linde Air Products; E. E. Fogle, Carbide & Carbon, and F. P. Shephard, Haynes Stellite.

♦

Roots-Connersville Blower Corp., Connersville, Ind., has appointed the following representatives to handle sales of its turbine pumps: Southern California Engineering Co., 174 South Western avenue, Los Angeles; Colby Equipment Co., 241 East Ohio street, Indianapolis; Lewis P. Heaven, 1304 McGee street, Kansas City, Mo.; J. H. and E. C. Roseberry, 702 Crosby building, Buffalo; Coblentz Equipment Co., Erie, Pa.; Allan T. Shepherd Co., Richmond, Va.; George F. Gilfrin, Apartado 63 Bis, Mexico, D. F. Exclusive jobbing arrangements have also been made with John E. Larrabee Co., Amsterdam, N. Y.; R. B. Wing & Son, Albany, N. Y.; Ellis W. Morse Co., Binghamton, N. Y.; Cameron & Barkley Co., Tampa, Fla.; Sanford Machine Co., Sanford, Fla.; Rural Electric & Supply Co., Spokane, Wash.; John Strumquist, Albuquerque, N. Mex.; Mora-Ona Co., Havana, Cuba.

FINANCIAL

BETHLEHEM FILES MORTGAGE BOND ISSUE

■ BETHLEHEM STEEL CORP. has filed with SEC a registration statement covering issuance of $25,000,000 consolidated mortgage 20-year 3¼ per cent bonds, series F. The consolidated mortgage is now a first mortgage on most of Bethlehem properties. Purpose of the new issue is to replace working capital used, or to be used, in the retirement of the first lien and refunding mortgage bonds of the Bethlehem Steel Co. and the first consolidated mortgage bonds of Lackawanna Steel Co. The new issue will be offered on or about June 17, by a group of underwriters.

APPROVE CHANGE IN CLIFFS CORP. COMMON STOCK

Stockholders of Cliffs Corp., Cleveland, at a special meeting voted to change the common stock from no-par to a par value of $5 per share. This adjustment reduces stated capital from slightly over $24,000,000 to approximately $4,000,000, and results in transfer to capital surplus of the difference between these two sums or about $20,000,000.

DIVIDENDS DECLARED

Arthur G. McKee & Co., Cleveland, regular quarterly of 25 cents and an extra of 75 cents on capital stock, payable July 1 to record June 20. This will make a total of $3 paid this year, while in the full year 1938, dividends aggregated $4 a share. Dollar volume of contracts booked in the first five months were approximately 80 per cent greater than in the corresponding 1938 period. Close to 52 per cent of the total bookings were from foreign sources.

Interlake Steamship Co., Cleveland, 25 cents on common, payable July 1 to record June 12. Paid same amount April 1.

Bliss & Laughlin Inc., Harvey, Ill., 25 cents on common, payable June 30 to record June 19. Similar payment was made in March.

National Steel Corp., Pittsburgh, 40 cents on capital stock, payable June 30 to record June 20. Like amount paid in preceding quarter.

Wheeling Steel Corp., Wheeling, W. Va., 50 cents on $5 prior preferred, payable July 1. Same amount paid April 1.

New Officers for Blast Furnace, Coke Group

■ G. W. Hewitt, production manager, blast furnace and coke works, Wheeling Steel Corp., Wheeling, W. Va., was elected president of the Eastern States Blast Furnace and Coke Oven association at the organization's annual spring meeting at Pittsburgh Field club, Pittsburgh, June 2.

H. W. Seyler, assistant general superintendent, by-product coke plant, Clairton works, Carnegie-Illinois Steel Corp., Clairton, Pa., was chosen vice president, and W. A. Steele, superintendent of blast furnaces, Crucible Steel Co. of America, Midland, Pa., secretary-treasurer.

The program consisted of informal technical discussions by the blast furnace and coke oven groups in the morning; the eighth golf competition for the Cleveland cup in the afternoon; and a dinner and business session in the evening.

F. D. Schreiber, assistant general superintendent, Pittsburgh Coke & Iron Co., Neville Island, Pa., presented to the coke oven group a paper on "Some Ideas on the Recovery of By-products." This was followed by a roundtable discussion on coke plant practices. The blast furnace group devoted its time to consideration of hearth, bosh and cast house design and furnace practices.

The golf cup was won by C. H. Pegg, superintendent of coke ovens, Pittsburgh Coke & Iron Co., Neville Island, Pa.

Builders of Industrial Furnaces Plan Meeting

■ Industrial Furnace Manufacturers' association will conduct its ninth annual meeting at Briarcliff lodge, Briarcliff Manor, N. Y., June 19-20. Program will include a business session, golf tournament and dinner on the first day; a business session on the second at which new officers will be elected. Effort will be made to formulate a uniform metal products program and consideration will be given to a set of tentative trade practice rules.

The association is composed of companies manufacturing industrial furnaces, ovens, accessories and allied equipment for heating, melting, making, refining, heat treating or processing metals and other materials. Stewart N. Clarkson, 420 Lexington avenue, New York, is executive vice president.

Steel Imports Up 68 Per Cent

■ APRIL iron and steel imports, excluding scrap, increased 68 per cent in volume over March, amounting to 41,314 gross tons valued at $2,703,290, compared with 24,589 tons valued at $1,478,663, according to the metals and minerals division, department of commerce. In April, 1938, imports were 21,225 tons valued at $1,140,875.

Germany was the chief source of April imports, 20,191 tons including 14,369 tons of miscellaneous pipe. Belgium was second with a total of 7945 tons. Canada supplied 1776 tons of spiegeleisen and 1322 tons of rails and track material.

Scrap imports were also higher in April, at 2769 tons valued at $29,366, compared with 780 tons valued at $11,927 in March. Only 12 tons valued at $385 were imported in April, 1938. Canada was the main supplier, 2660 tons, with Sweden contributing 103 tons, Belgium 5 tons and the Netherlands Indies 1 ton.

FOREIGN TRADE OF UNITED STATES IN IRON AND STEEL

Gross Tons

	1939		1938	
	Exports	Imports	Exports	Imports
Jan.	362,672	27,664	586,294	29,631
Feb.	359,690	19,149	460,640	19,589
March	474,360	25,369	526,883	11,827
April	394,008	44,083	489,202	21,237
May	.....	.....	540,639	20,814
June	.....	.....	312,021	15,887
July	.....	.....	263,699	14,728
Aug.	.....	.....	242,139	20,041
Sept.	.....	.....	346,068	27,958
Oct.	.....	.....	425,431	26,445
Nov.	.....	.....	469,596	27,627
Dec.	.....	.....	490,095	28,767
Total	.....	.....	5,152,707	264,551

ORIGIN OF APRIL IMPORTS

Gross Tons

	Iron ore	Pig iron	Manganese ore	Ferro-manganese
Norway	20,444	.....	.....	1,125
United Kingdom	10	.....	.....	.....
Canada	33	178	12	.....
Cuba	21,500	.....	3,063	.....
Chile	120,100	.....	.....	.....
Iran	26	.....	.....	.....
British India	.....	3,234	2,098	.....
Brazil	.....	100	.....	.....
Soviet Russia	.....	.....	580	.....
Gold Coast	.....	.....	3,833	.....
France	.....	.....	.....	63
Netherlands	.....	.....	.....	89
Czechoslovakia	.....	.....	.....	102
Poland	.....	.....	.....	528
Jugoslavia	.....	.....	.....	91
Total	162,113	3,512	9,586	1,998

	Sheets, skelp and sawplate	Structural steel	Steel bars	Hoops and bands
Belgium	129	3,950	962	1,073
France	12	1,771	521	300
Germany	182	152	161	174
Sweden	2	.....	115	2
United Kingdom	.....	.....	36	.....
Total	325	5,873	1,795	1,549

U. S. IMPORTS FOR CONSUMPTION OF IRON AND STEEL PRODUCTS

Gross Tons

Articles	April 1939	March 1939	Jan. thru Apr.'39
Pig iron	3,512	3,658	8,359
Sponge iron	152	151	603
Ferromanganese (1)	1,998	3,307	11,344
Spiegeleisen	1,778	2,176	6,963
Ferrochrome (2)	39	34	73
Ferrosilicon (3)	110	125	582
Other ferroalloys (4)	37	38	107
Steel ingots, blooms	.....	2	3
Billets	40	32	86
Concrete reinforc. bars	596	183	1,306
Hollow bar, drill steel	75	134	372
Bars, solid or hollow	1,795	1,586	6,954
Iron slabs	.....	.....	.....
Iron bars	41	59	229
Wire rods	638	821	3,366
Boiler and other plate	1	2	3
Sheets, skelp, saw pl.	325	224	816
Die blocks or blanks	1	12	15
Tin plate, taggers' tin and terne plate	.....	4	19
Structural shapes	5,873	3,965	15,684
Sashes and frames	.....	.....	5
Sheet piling	462	.....	462
Rails and fastenings	1,567	212	2,166
Cast iron pipe & ftgs.	72	71	275
Malleable iron pipe ftgs.	.....	5	20
Welded pipe	1,652	814	2,953
Other pipe	14,467	1,328	23,482
Cotton ties	.....	.....	2
Other hoops and bands	1,549	1,867	6,980
Barbed wire	1,815	2,065	6,546
R'nd iron & steel wire	139	348	1,054
Teleg. and teleph. wire	1	.....	2
Flat wire & steel strips	264	296	996
Wire rope and strand	296	126	796
Other wire	213	155	859
Nails, tacks, staples	1,419	779	3,547
Bolts, nuts and rivets	7	18	43
Horse and mule shoes	29	25	162
Castings and forgings	351	67	736
Total	41,314	24,589	107,970
Iron and steel scrap	2,769	780	8,295
GRAND TOTAL	44,083	25,369	116,265

(1) Manganese content; (2) chrome content; (3) silicon content; (4) alloy content.

April Machinery Exports Show 4 Per Cent Gain

■ April industrial machinery exports were valued at $24,592,486, 4 per cent increase over $23,672,566 in April, 1938, according to the machinery division, department of commerce. Power-driven metalworking machinery exports, valued at $8,854,755, were below the record volume of March but 13 per cent above those of April, 1938. All major classes showed increases except power generating and construction and conveying equipment, which declined, 38 and 16 per cent, respectively, compared with April last year.

Heavy shipments of rolling mill machinery provided the largest factor in power-driven metalworking machinery increase, $1,476,816 compared with $304,369.

■ Italy has issued four coins in a steel alloy, "acmonital," in 20 and 50 centesimi and one and two lira denominations. The alloy name is derived from *acciaio monetale Italiano* (steel money of Italy). Coins of similar value issued in 1936 were of nickel. Use of steel, it is said, will release considerable nickel for other purposes, particularly munition manufacture.

Farm Equipment Exports Higher

■ AMERICAN farm implement and machinery exports in 1938, valued at $75,442,000, were distributed to 108 foreign markets, compared with $75,367,000 to 105 markets in 1937, according to the machinery division, department of commerce. Foreign sales were increased or well maintained in most countries, the net gain being reduced by sharp losses in a few major markets, notably Australia, the United Kingdom, France, Mexico and Uruguay.

Canada and Argentina which usually rank first and second, in 1938 took 27 and 19 per cent of total exports in this class.

Exports to Oceanic countries in 1938 totaled $9,548,000, a loss of 24 per cent from $12,524,000 in 1937. Smaller shipments of tractors and parts to Australia accounted for most of this loss. New Zealand, the other large purchaser in this division, increased its orders. Both these countries in recent years have bought more than in 1929.

More than half the shipments to Africa in 1937 and 1938 went to the Union of South Africa, fourth best customer for American farm machinery.

European markets last year purchased farm machinery to the value of $11,766,000, representing 16 per cent of the total, compared with $7,432,000 in 1937.

Germany and the United Kingdom are principal competitors of American implements in world markets, the former through barter agreements for raw materials.

Comparisons are found in the following table:

	1938	1937
Canada	$20,665,000	$18,661,000
South America	19,602,000	16,606,000
Africa	8,660,000	8,307,000
Australia	6,292,000	9,616,000
United Kingdom	3,946,000	4,575,000
New Zealand	3,228,000	2,860,000
Central America	2,853,000	4,621,000
Asia	2,341,000	2,640,000
Sweden	2,283,000	1,811,000
France	1,386,000	1,705,000
Portugal	701,000	497,000
Italy	603,000	612,000
Netherlands	436,000	360,000
Rumania	431,000	280,000
Finland	400,000	408,000
Germany	317,000	213,000

April exports of farm implements and machinery were valued at $7,067,114, a decline of 17 per cent from $8,512,988 in April, 1938. All five major groups showed losses, from 7 per cent in tractors and parts to 63 per cent in seed separators. Tractors and parts, constituting 78 per cent of the total, represented a value of $5,512,495, compared with $5,920,282 in April, 1938.

May Ingot Rate Lowest This Year

■ OPEN-HEARTH and bessemer steel ingot output in May totaled 2,917,876 gross tons, according to the American Iron and Steel institute. This was 69,109 tons, or 2.3 per cent, less than 2,986,985 tons made in April, but 62 per cent larger than 1,800,877 tons produced in May, 1938.

In May the industry operated at an average of 48.24 per cent of capacity, lowest rate this year, compared with 50.99 per cent in April and 30.30 per cent in May, 1938.

Weekly average production was 658,663 tons, about 5 per cent below the April average of 696,267 tons. In May, 1938, weekly average was 406,519 tons.

For five months this year production totaled 15,499,546 tons, compared with 9,155,740 tons for the corresponding months in 1938.

Canadian Output Gains

■ Canada's production of steel ingots, castings and pig iron in April was larger than in March but below that of April, 1938. Four months' output was less than that of the corresponding period a year ago. Comparisons follow:

	Gross Tons Steel ingots, castings	Pig iron	Ferro-alloys
April, 1939	99,752	46,254	4,284
March, 1939	95,697	40,723	3,526
April, 1938	116,445	65,644	8,686
Four Mos., 1939	350,826	185,970	15,964
Four Mos., 1938	446,481	268,181	22,650

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended June 10	Change	Same week 1938	Same week 1937
Pittsburgh	43	+ 1	19.3	92
Chicago	52.5	— 1	22	63
Eastern Pa.	37	None	25.5	64.5
Youngstown	51	+ 3	25	30
Wheeling	73	+ 3	38	95
Cleveland	53	None	31	46
Buffalo	44	None	23	89
Birmingham	67	+ 7	58	83
New England	40	+ 5	25	45
Cincinnati	68	+ 8	16	93
St. Louis	47	+ 9.5	39.3	85
Detroit	57	None	18	95
Average	53.5	+ 1.5	25.5	74

Republic To Rebuild Warren Blast Furnace

■ Republic Steel Corp. will rebuild the blast furnace at its Warren, O., plant, enlarging capacity to 1000 tons or more per day. Originally known as the Trumbull Cliffs furnace, it was built in 1921, slightly enlarged in 1931.

Bosh diameter will be increased from 28 feet 6 inches to 30 feet; stockline diameter from 19 feet to 19 feet 6 inches; height from center tuyeres to top ring from 84 feet to 98 feet 7 inches.

■ Commercial steel castings booked in April totaled 34,100 net tons, compared with 41,367 tons in March, census bureau reports. Four months' bookings were 147,851 tons, against 110,115 in the period last year.

Steel Ingot Statistics

	Calculated Monthly Production—All Companies —Open Hearth— Gross tons	Per cent of capacity	—Bessemer— Gross tons	Per cent of capacity	—Total— Gross tons	Per cent of capacity	Weekly production, all companies, gross tons	Number of weeks in month
1939	**Reported by Companies which in 1938 made 97.31% of Open-Hearth and 99.90% of Bessemer.**							
Jan.	3,069,011	55.73	147,642	27.26	3,216,653	53.18	726,107	4.43
Feb.	2,785,629	56.02	196,382	40.16	2,982,011	54.60	745,503	4.00
March	3,201,132	58.13	194,889	35.99	3,396,021	56.14	766,596	4.43
April	2,781,008	52.15	205,977	39.28	2,986,985	50.99	696,267	4.29
May	2,747,550	49.89	170,326	31.45	2,917,876	48.24	658,663	4.43
5 mos.	14,584,330	54.36	915,216	34.69	15,499,546	52.60	718,143	21.58
1938	**Reported by Companies which in 1938 made 98.67% of Open-Hearth and 99.90% of Bessemer.**							
Jan.	1,634,224	30.28	99,941	18.27	1,734,165	29.17	391,459	4.43
Feb.	1,572,009	32.26	125,443	25.39	1,697,452	31.63	424,363	4.00
March	1,846,517	34.21	157,687	28.82	2,004,204	33.72	452,416	4.43
April	1,786,942	34.19	132,100	24.93	1,919,042	33.34	447,329	4.29
May	1,669,455	30.93	131,422	24.02	1,800,877	30.30	406,519	4.43
5 mos.	8,509,147	.....	646,593	.....	9,155,740	.....	424,269	21.58
June	1,513,715	28.96	119,128	22.48	1,632,843	28.36	380,616	4.29
July	1,846,319	34.29	127,998	23.45	1,974,317	33.29	446,678	4.42
Aug.	2,340,363	43.36	196,739	35.96	2,537,102	42.68	572,709	4.43
Sept.	2,440,192	46.80	206,937	39.15	2,647,129	46.09	618,488	4.28
Oct.	2,882,827	53.41	223,158	40.78	3,105,985	52.25	701,125	4.43
Nov.	3,357,167	64.23	201,196	37.97	3,558,363	61.81	829,455	4.29
Dec.	2,971,834	55.19	158,912	29.11	3,130,746	52.79	708,314	4.42
Total	25,861,564	40.71	1,880,661	29.20	27,742,225	39.65	532,072	52.14

Percentages of capacity operated for 1939 are calculated on weekly capacities of 1,243,153 gross tons open-hearth ingots and 122,248 gross tons bessemer ingots; total, 1,365,401 gross tons; based on annual capacities as of Dec. 31, 1938, as follows: Open-hearth ingots, 64,817,994 gross tons; bessemer ingots, 6,374,000 gross tons.

Percentages of capacity operated for 1938 are calculated on weekly capacities of 1,218,342 gross tons of open-hearth ingots and 123,514 gross tons of bessemer ingots; total, 1,341,856 gross tons; based on annual capacities as of Dec. 31, 1937, as follows: Open-hearth ingots, 63,524,356 gross tons; bessemer ingots, 6,440,000 gross tons.

PRODUCTION

■ STEELWORKS operations last week advanced 1.5 points to 53.5 per cent. Increases were noted in seven districts and a decline in one; four were unchanged. Year ago the rate was 25.5 per cent, two years ago 74 per cent.

Youngstown, O.—Up 3 points to 51 per cent, 44 open hearths in production. The rate has gained 9 points in three weeks. Another open hearth is scheduled to be added this week.

St. Louis—Increased 9.5 points to 47 per cent. Three open hearths were added, and one taken off the active list.

Detroit — Unchanged at 57 per cent, one interest holding production level with shipments, with no additions to stock.

Birmingham, Ala.—Up 7 points to 67 per cent, 14 open hearths active.

Pittsburgh—Minor revisions raised the rate 1 point to 43 per cent.

Wheeling — Additional production at one plant advanced the rate 3 points to 73 per cent.

New England—Rose 5 points to 40 per cent. Indications are for lower rate this week as one plant closes until July 9.

Buffalo — Steady at 44 per cent. One additional blast furnace has been lighted.

Central eastern seaboard—Held at 37 per cent. Little change is expected for remainder of June.

Cincinnati—Reported second successive increase of 8 points, to 68 per cent. Part of recent gains are in anticipation of July curtailment by American Rolling Mill Co. for realignment of rolling facilities.

Cleveland—Steady at 53 per cent despite minor adjustments by all producers. Some mills will increase schedules this week.

Chicago—Declined 1 point to 52.5 per cent, due mainly to reductions by smaller mills.

Revises Auto Estimate

■ Subsequent to its estimate of automobile production for the week ended June 10, as reported on page 40, this issue, *Ward's Reports* revised its figures, increasing output to 65,265 units. According to the revised estimate, General Motors produced 30,640; Chrysler 8145; Ford 17,600; all others 8820.

Foundry Strike Settled

■ Strike at Pittsburgh Steel Foundry Corp., Glassport, Pa., was settled last week, pickets withdrawn from mill gates, plans made to return to production basis this week. The strike started March 2 in protest to proposed 15 per cent wage reduction.

MEN OF INDUSTRY

■ C. F. GOLDCAMP has been appointed manager of sales, cold finished department, Jones & Laughlin Steel Corp., Pittsburgh, to succeed the late J. D. Allen. Mr. Goldcamp started with Jones & Laughlin in 1923, after graduating from Lehigh university as a chemical engineer. His first position was in the inspection department, Pittsburgh works. Subsequently he became assistant chief inspector; chief inspector, Soho works; contact man for hot rolled and cold finished products, in the general metallurgical department, and salesman in the cold finished sales department.

♦

J. T. Leach, representative of the metallurgical department, American Steel & Wire Co., Cleveland, sailed from New York June 2 on a tour of South American markets for the company.

♦

J. Frederic Wiese, who since 1935 has been assistant to vice president, Lukens Steel Co., Coatesville, Pa., has been appointed general manager of sales. After graduating, Mr. Wiese was associated four years with the Chicago sales office of Parkesburg Iron Co. He then was transferred to the company's home office. He joined Lukens in August, 1926, and has served in its flanging, railroad and general sales departments. He was appointed assistant to vice president in charge of sales in 1935. Mr. Wiese is a member, American Iron and Steel institute.

♦

G. S. Crane, associated with Cutler-Hammer Inc., Milwaukee, 29 years, has been elected vice president in charge of sales and engineering. He will supervise development work as well as the engineering, drafting and patent departments. In 1931 Mr. Crane was elected a director and in 1935 was named vice president in charge of sales, which position he held until his recent appointment.

G. S. Crane

C. F. Goldcamp

J. Frederic Wiese

♦

George D. Moomaw has been appointed works manager, Rustless Iron & Steel Corp., Baltimore. The past 13 years he was associated with Crucible Steel Co. in an engineering and managerial capacity.

♦

W. L. Weaver, formerly special representative, Allegheny Ludlum Steel Corp., Pittsburgh, working out of the Watervliet, N. Y., office, has been appointed district sales manager for the New England territory, with headquarters in Springfield, Mass. J. F. Dolan Jr., previously district sales manager in New England for products of the tool steel division, has been made assistant district sales manager, New England territory, in which all products of the corporation will be handled.

♦

M. B. McCafferty has been made district sales manager of Wheeling Steel Corp.'s new district sales office in the Terminal Tower, Cleveland. Harvey O. Albrecht, Wheeling's resident salesman in Cleveland for a number of years, will be associated with Mr. McCafferty.

♦

Oliver Smalley, president, Meehanite Metal Corp. and Meehanite Research Institute of America Inc., Pittsburgh, sailed for London June 10. He will spend about two months visiting various Meehanite manufacturers in England, Continental Europe, Norway and Sweden.

♦

Fred T. Llewellyn, who retired June 1 as research engineer for the United States Steel Corp. of Delaware, after nearly 50 years' service with the corporation, STEEL, May 1, page 20, was presented, upon the eve of his retirement from business, with an engrossed resolution of appreciation for his contribution to the structural steel fabricating industry by the American Institute of Steel Construction, New York.

♦

Walter F. Perkins has been elected a director, Koppers Co., Pittsburgh. He joined the former Bartlett Hayward Co. in 1915 as assistant superintendent, and was general superintendent in 1927 when he went to Worthington Pump & Machinery Corp., Harrison, N. J., as works manager. Returning to Bartlett Hayward in 1932 as vice president and general manager, he later became president, a position he held until the company was absorbed as a division of Koppers in 1936. He has been vice president of Koppers Co. since that time and is in charge of the

Walter F. Perkins

Bartlett Hayward and American Hammered Piston Ring divisions, and the Maryland Drydock Co., a subsidiary.

♦

E. Earl Fisher, formerly eastern division manager, Colorado Fuel & Iron Corp., Denver, has been elected manager of sales, hot rolled products, succeeding W. H. Messner, who has been assigned to other duties in the general offices. He has been associated with the company since 1910.

♦

Richard Rimbach has been named technical adviser to R. C. Enos, president, Standard Steel Spring Co., Coraopolis, Pa. He will work

Richard Rimbach

on the development and promotion of a new process for applying to steel a pore-free metallic coat. Mr. Rimbach was formerly director of research, Standard Steel Car Co., editor of *Metals and Alloys*, and more recently consulting metallurgical engineer.

♦

Norman A. Evans has been appointed sales manager, Pressed Steel Tank Co., Milwaukee. Mr. Evans has been a member of the com-

Norman A. Evans

E. Earl Fisher

pany's sales force since 1931. After completing his education in engineering, and before becoming associated with the Pressed Steel company he was engaged in manufacturing, design and sales engineering work for more than four years.

♦

Herbert H. Rogge, formerly manager of the syndicate division of Westinghouse Electric International Co., New York, has been named manager of Westinghouse Electric & Mfg. Co.'s agency sales department, with headquarters in Pittsburgh. Mr. Rogge joined the International company in 1926, following four years of general engineering work with the parent or-

H. H. Rogge

ganization. He served as special representative in Manila, P. I.; later was transferred to Soerabaya, Java; returned to New York in 1929 as syndicate representative of the company, and was promoted successively to manager, syndicate division; manager, New York sales; and sales manager.

♦

E. E. Tross, the past seven years general superintendent, Youngstown, O., plants of United Engineering & Foundry Co., Pittsburgh, has been named district manager at Youngstown. He succeeds George W. Knotts, who has retired after serving the industry 52 years. Mr. Tross returned to this country two months ago from Great Britain where he finished building a new steel plant for Richard Thomas Co., at Ebbw Vale.

♦

Vincent Delport, European manager of STEEL and other Penton publications, was awarded the gold medal of Association Technique de Fonderie at its eighteenth annual convention in Paris, May 20, for his activities in developing goodwill and relationships between the foundry associations of various countries. Mr. Delport is European representative of the American Foundrymen's association and past president, International committee of Foundry Technical associations. Silver medals were awarded to J. M. Espana, vice president of the Association Technique for services rendered to that organization and also for the time and effort he has devoted as chairman of the International Dictionary committee, and to J. Challansonnet for technical contributions in the field of alloy cast irons.

DIED:

■ H. G. MOORE, 74, formerly vice president and general sales manager, Keystone Steel & Wire Co., Peoria, Ill., in Peoria, June 2. He retired 14 years ago.

♦

Harry B. Thompson, 50, production manager Clark Equipment Co.'s works in Buchanan, Mich., June 6. He had been with Clark Equipment since 1926.

♦

Walter J. Miller, formerly works manager, American Steel Foundries, Chicago, and the past four years with the Keokuk Steel Casting Co., Keokuk, Iowa, recently in Mercer, Calif.

♦

Thomas F. Cole, 77, formerly identified with the Lake Superior iron ore and Michigan copper industries, in Pasadena, Calif., June 3. He joined Oliver Iron Mining Co. as superintendent at Ironwood, Mich., in 1897, served as general superintendent until May 10, 1901, when he was chosen president. He resigned in February, 1909, to become interested in copper mining.

♦

Thomas B. Metzger, 59, Cleveland consulting engineer and former superintendent of the engineering department of Cambria Steel Co., and the Johnstown Water Co., a subsidiary of Bethlehem Steel Co., May 25 at his home in Lakewood, O.

Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

■ STEEL industry is not opposed to the national labor relations act and to the principles upon which it is based, Walter S. Tower, executive secretary, the American Iron & Steel institute, told the senate committee on education and labor last week at its hearings on proposed amendments. He summarized seven changes which the steel industry believes necessary to accomplish the declared purposes of the act.

Mr. Tower often was interrupted during his statement by Senators Thomas, Utah, and Ellender, Louisiana, who insisted on getting into the record matters entirely foreign to the labor act. Thomas, a member of the LaFollette civil liberties committee, interjected many questions and comments on the steel industry's labor problems with especial reference to public relations and publicity.

Senator Ellender dealt at length in questions and comment on the opposition which the steel industry had originally had to the enactment of the Wagner act. Mr. Tower stated the opposition was based only on the feeling the bill did not fully guarantee the right of self organization by employes. He said the institute had always believed in collective bargaining.

Explains Industry's Opposition

Mr. Tower said that when the act was being considered by congress many members of the industry believed its provisions and the administrative procedure would not accomplish the purposes sought and the industry believes "the results of the operation of the act have fully justified the fears which members of the industry expressed when the act was before congress. Now, therefore, that your committee is considering the amending of the act, the institute believes that it should present to your committee the views of the industry with respect to certain fundamental principles which in its opinion should be recognized in any federal legislation regarding labor relations."

The industry believes, he said, that no one can properly deny that under the act as it now stands those liberties are not fully protected. The real question is how can the act be changed so that it will afford complete protection to those liberties.

"The act expressly recognizes and protects the rights of employes to strike," Mr. Tower continued. "It does not expressly recognize or protect the right of every American citizen to work. The act should do that, and in such clear manner as will require the effective enforcement of that right.

Present Act Promotes Strife

"If the act is to be so applied as to cut off the normal intercourse between employes and employers, it will surely promote unrest and even strife between them. To prohibit employers from expressing their opinions or giving advice to their employes with respect to matters having to do with labor relations tends to create a barrier between them and to promote industrial discord and strife to the detriment, not only of employers and employes, but also of the general public.

"In conformity with the declared purposes of the act employes should have full freedom to decide for themselves whether or not to join any labor organization. In its failure to afford to employes protection from interference, restraint or coercion by other employes or by organizations of employes, the act fails to accomplish its purposes."

The witness told the committee the act should be so changed that it will afford adequate protection to employes against interference, restraint and coercion by anyone in the exercise of their rights to full freedom of choice in self organization and in the selection of representatives for the purpose of collective bargaining. He said that the act does not now afford adequate protection to employes in the exercise of their rights.

Mr. Tower said he did not intend to suggest the specific phraseology of any amendment, but only to state "the general principles which the steel industry believes should be followed in determining what amendments are necessary to accomplish the purposes of the act."

Changes the steel industry believes necessary to accomplish the declared purposes of the act are:

1—To provide full protection to employes in the exercise of their collective bargaining rights against interference, restraint or coercion by anyone.

2—To safeguard the right of free speech by specifically permitting employers to express opinions and to confer and advise with employes.

3—To permit a direct appeal to the courts by both employes and employers from labor board decisions regarding the representation of employes.

4—To provide that, in any court proceeding to enforce or review a board decision, findings of fact by the board shall be conclusive only if supported by the evidence.

5—To limit the time within which the board may issue a complaint involving an alleged unfair labor practice.

6—To place the prosecuting and judicial functions under the act in separate and independent bodies.

7—To enlarge the body which shall adjudicate cases under the act sufficiently to insure full consideration by one or more of its members of all cases presented to it for decision.

CRITICAL MATERIALS BILL SIGNED, BECOMES LAW

The strategic and critical materials bill for the accumulation of stockpiles of essential materials, which has been pending for the past two sessions, has been signed by the the President, as expected; in

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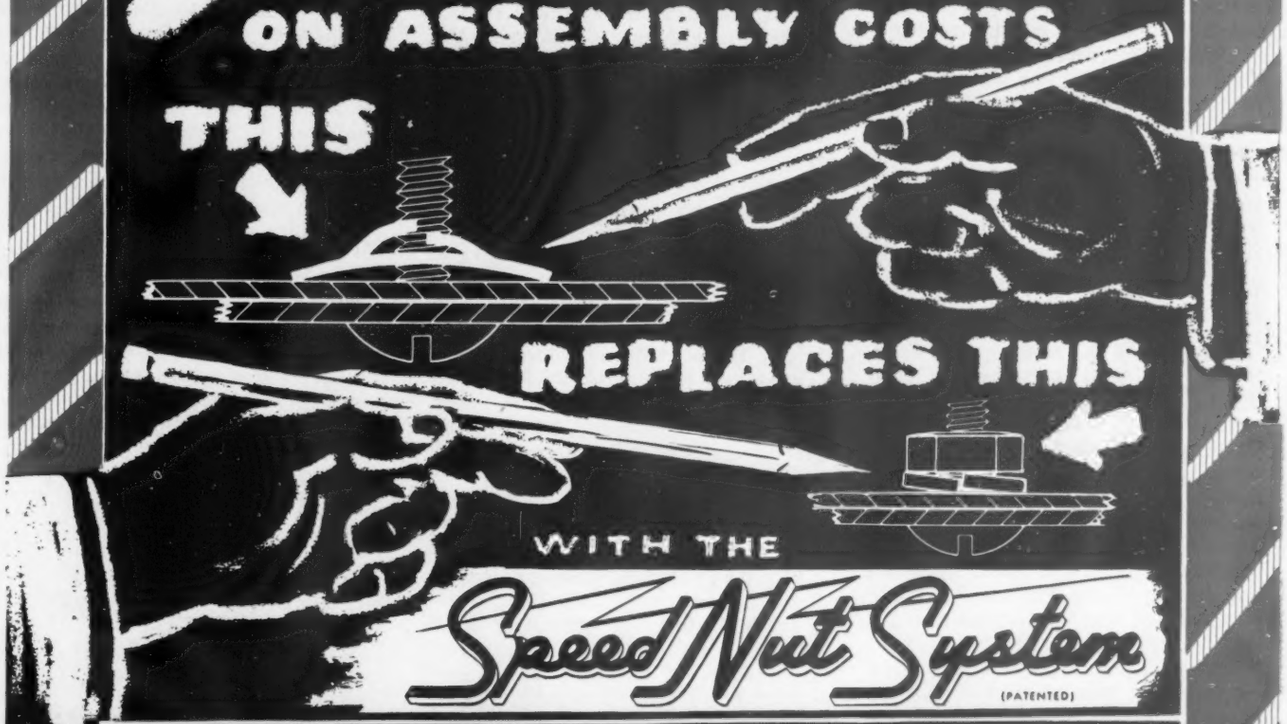

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fact it is an administration measure.

Bill authorizes expenditure of $100,000,000 over a 4-year period from June 30 for the purchase of strategic materials. An authorization of $500,000 a year for the same period is also provided, of which amount $350,000 will be for the bureau of mines and $150,000 for the geological survey for metal and mineral explorations.

This is merely an authorization bill and does not carry the actual appropriation. There is feeling in Washington the President will not favor an appropriation of more than $10,000,000 for the coming fiscal year.

AWAIT DECISION IN STEEL WAGE CASE

Court of appeals of the District of Columbia has not yet issued its decision in connection with minimum steel wages set by the public contracts board under the Walsh-Healey act.

Those who have watched the situation closely believe the court is divided and effort is being made to reach some kind of a compromise.

The labor secretary's ruling on steel wages has now been in the courts for some months. The district court ruled the decision was not "arbitrary and capricious." Case then was carried to the court of appeals which decided the minimum wage decision should be suspended until the final decision of the court.

WAYS AND MEANS COMMITTEE HEARS TAX REVISION PLAN

House ways and means committee, which originates all revenue legislation, continued tax hearings last week. Chairman Doughton, North Carolina, announced the committee would confine hearings to corporate taxes. He said, however, those who wished might file briefs regarding income and excise taxes. These briefs, he said, can be considered by the tax subcommittee and the ways and means committee in writing its tax revision bill.

Ways and means members have emphasized that a tax must be passed by congress and signed by the President by June 30 when the excise or nuisance taxes expire. The committee expects to propose continuing the excise taxes which bring in one-half billion dollars a year revenue and, in addition, will suggest several revisions in corporate taxes.

John W. Hanes, undersecretary of the treasury, indorsed the tax recommendations made earlier by Secretary Morgenthau. As related in these columns, they included removal of tax irritants such as the undistributed profits tax, and the capital stock and excess profits taxes.

Mr. Hanes also said the budget could not be balanced, at present, by merely cutting expenditures, but that a larger national income was necessary. Stimulation of private investments and enterprise, he explained, would provide the larger national income he said was necessary to provide sufficient federal revenue to balance the budget.

Noel Sargent, secretary of the National Association of Manufacturers, also appeared before the committee and recommended a constructive federal tax revision. He told the committee there are eight elements which, if eliminated, would be a real help to business recovery.

These were: Reduction of federal surtax rates which discourage investment of savings in private industry; abolition of the present capital gains and losses provisions in the federal income tax; exemption of corporate dividends paid to individuals from normal income tax since this involves double taxation; elimination of the taxation of intercorporate dividends which results in double taxation; abolition of the undistributed earnings tax; abolition of the combined federal excess profits and capital stock taxes; elimination of the ban on consolidated returns; and elimination of the ban on offsetting previous capital losses against current profits.

Mr. Sargent submitted—with regard to the proposal to abolish capital gains and losses provisions in the federal income tax—that with benefit to the taxpayer and without injury to the treasury, the present law should be amended so that all capital gains and losses of corporations shall be treated as ordinary income and loss for the purposes of taxation.

In urging elimination of taxation of intercorporate dividends Mr. Sargent said:

"Under present business conditions the industrial subsidiary relationship is often a necessary piece of business machinery; such necessary pieces of business machinery cannot be destroyed without loss to investors, disruption of the business mechanism, and a brake on industrial production and employment. The indiscriminate taxation of intercorporate dividends directed at so-called 'holding companies' detrimentally affects thousands of legitimate industrial subsidiary relationships of an entirely different character."

PROPOSES APPELLATE COURT FOR PATENT CASES

Copy of a proposed bill regarding legislation for the creation of a circuit court of appeals for patents was sent to congress last week by Secretary of Commerce Hopkins.

The bill, proposed for immediate enactment, provides for the establishment of a single 5-man court to decide appeals involving the validity, ownership and infringement of patents, with jurisdiction over patent cases in the United States proper and in the insular possessions.

HOUSE MAY VOTE PROBE OF LABOR RELATIONS BOARD

Congressional leaders have told the Chief Executive that unless congress gets an opportunity to vote on amendments to the Wagner act at this session the house probably will pass a resolution calling for a complete investigation of the national labor relations board.

Representative Cox, Georgia, sometime ago introduced such a resolution and it is understood a campaign is being made in the house to obtain support for it. Mr. Cox has stated that he will ask the rules committee to approve his resolution unless the labor committee reports out amendments to the Wagner act in time for action this session.

Expression from leaders in the house is to the effect the house will undoubtedly act favorably if the resolution is brought to the floor for the appointment of a special house committee to inquire into the boards activities.

GOVERNMENT IRON, STEEL AWARDS TOTAL $863,391

Government steel awards made under the Walsh-Healey act for the week ended May 27 were: Enterprise Foundry Co., San Francisco, $22,000; J. Edward Ogden Co., New York, $83,460; Assoc. Piping & Engr. Co., Ltd., Los Angeles, $167,600; Truscon Steel Co., Washington, $11,595.23 (estimated); Carnegie-Illinois Steel Corp., Washington, $17,984.53; Worth Steel Co., Claymont, Del., $21,329 (estimated); Central Iron & Steel Co., Harrisburg, Pa., $122,198 (estimated); Lukens Steel Co., Coatesville, Pa., $73,183.45 (estimated); American Bridge Co., Inc., New York, $58,713.60; Bethlehem Steel Co., New York, $17,943.24 (estimated); The Ohio Corrugated Culvert Co., Middletown, O., $21,749.97; The Ingalls Iron Works Co., Birmingham, Ala., $45,750; Firth Sterling Steel Co., McKeesport, Pa., $11,284.20; Wire Rope Corp. of America Inc., New Haven, Conn., $29,960.34; The Van Dorn Iron Works Co., Cleveland, $48,900; Parish Pressed Steel Co., Reading, Pa., $10,749; Carlisle Foundry Co., Carlisle, Pa., $20,564.16; Walter Kidde & Co. Inc., New York, $61,280; and The Columbiana Boiler Co., Columbiana, O., $17,101. Awards totaled $863,390.72.

AVIATION

SEE MILITARY NEEDS LIFTING 1939 EXPORTS TO $100,000,000

■ EXPORTS of aeronautical products, already at record levels, are expected to show further gains in the next six months. Most of the large military orders recently placed by foreign powers must be filled this year. It is estimated shipments will exceed $100,000,000, as against $68,200,000 for 1938.

This will constitute approximately 50 per cent of the year's output. During the past five years exports aggregating $143,000,000 represented but 30.6 per cent of total production.

No. 1 aircraft exporter, the United States in 1938 shipped 45.6 per cent of the $150,000,000 world total. Next in rank were Great Britain and Germany.

Our best customers today are France and Great Britain, while Japan was last year's leading buyer. South American markets are gradually being lost by domestic planemakers to German and Italian builders, civil aeronautics authority reports.

Legislation recently passed by congress provides $1,800,000 for expanding the naval aircraft factory at Philadelphia, now constructing fighting planes. Funds will become available July 1 with start of the new fiscal year.

Transcontinental & Western Air Inc. has established at Kansas City, Mo., a new engineering department for research and development, headed by D. W. Tomlinson, chief engineer. Last week this line announced a service expansion, the third during 1939, bringing to 24 per cent its increase in scheduled seat-miles.

First builder of large airplanes to adopt assembly line production similar to that of the automobile industry is Boeing Aircraft. This company has just set up such a production system in its 175,000-square foot No. 2 plant at Seattle, will turn out 22-ton "flying fortress" bombers for army air corps. Special production lines of wings and subassemblies lead up to the main line, where planes progress through eight assembly stages.

Ford Motor Co. of France, Asnieres, France, plans to form a new Fordair division, and will equip a plant for producing military planes.

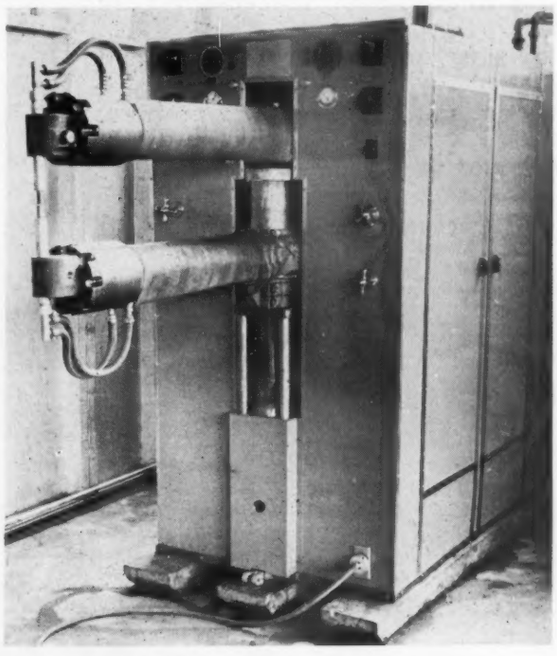
Solar Aircraft Co., San Diego, has booked an order from Glenn L. Martin Co. for engine cowlings and stainless steel exhaust manifolds costing $90,000.

Announce New Products

Aircraft division of Fafnir Bearing Co., New Britain, Conn., announces two new series of extra-heavy capacity bearings designed for large planes. Said to be highly corrosion-resistant, these bearings are prepacked with lubricant.

Use of diesel engines in aircraft may be facilitated by equipping the diesel-powered craft with a small electrical cracking unit, according to experts of the Ethyl Gasoline Corp. The unit would crack the slow-burning "safety fuel" to realize the more volatile fixed gas necessary for starting, thereby eliminating need for special starting fluids.

International Derrick & Equipment Co., Columbus, O., has inaugurated a new line of all-steel, sliding-door airplane hangars, using 26-gage galvanized corrugated sheet.



New Welder For Aircraft

■ **Stainless steel, aluminum and duralumin airplane assemblies are welded at Ryan Aeronautical Co.'s San Diego plant with this new spot welder. Designed by Ralph Thacker, head of the Resistance Welding division, Harvey Machine Co., Los Angeles, it may be operated with arms spaced 4 to 18 inches apart, under pressure up to 1500 pounds. Machine can be converted into a continuous seam welder**

New Ships Take 70,000 Tons Steel

■ TWENTY-FOUR vessels awarded by the navy last week will require about 40,000 tons of steel, and bids will be opened July 11 for twelve C-1 maritime commission cargo vessels needing 30,000 tons.

The navy awards represent $355,000,000, of which more than $100,000,000 is in contracts to private yards. These vessels come under the 1940 building program for which funds have been provided in the naval appropriation act recently signed by the President, and the second deficiency act of last year.

Newport News Shipbuilding & Dry Dock Co., Newport News, Va., was awarded a 20,000-ton aircraft carrier at $31,800,000. Bath Iron Works, Bath, Me., and Federal Shipbuilding & Dry Dock Co., Kearny, N. J., each received two 1630-ton destroyers, totaling $9,626,000 and $9,790,000, respectively.

General Motors Corp., Detroit, and Fairbanks, Morse & Co., Chicago, shared a $5,430,576 order for six sets of submarine propelling equipment, three each. Federal Shipbuilding & Dry Dock Co. and Bethlehem Steel Co. each received a contract for two light cruisers to cost $12,226,000 each. Electric Boat Co., Groton, Conn., was awarded three submarines at $2,937,000 each.

Two Battleships Awarded

Awards to navy yards included two 45,000-ton battleships, four destroyers, four submarines and two small seaplane tenders.

The maritime commission C-1 cargo ships are a new classification, smallest of the three types, with deadweight of about 8000 tons, compared with 9200 tons for C-2 vessels and 12,000 tons for C-3 ships. Maritime commission has placed 14 contracts this year, all for C-3 ships. Placing the 12 for which bids have been asked will bring the total to 26, just over half the 50 craft the commission plans to build annually in its 10-year program.

American bureau of shipping reports 129 vessels aggregating 631,850 gross tons were under construction to its classification June 1. This compares with 152 vessels of 654,890 gross tons May 1, and 119 vessels of 464,095 tons a year ago. Of the June 1 total 72 were seagoing vessels of 611,750 gross tons, seven units of 12,160 gross tons total having been added during May.

■ Orders for fabricated steel plate in April totaled 35,844 net tons, compared with 29,784 tons in March and 21,958 tons in April, 1938, as reported to the census bureau.

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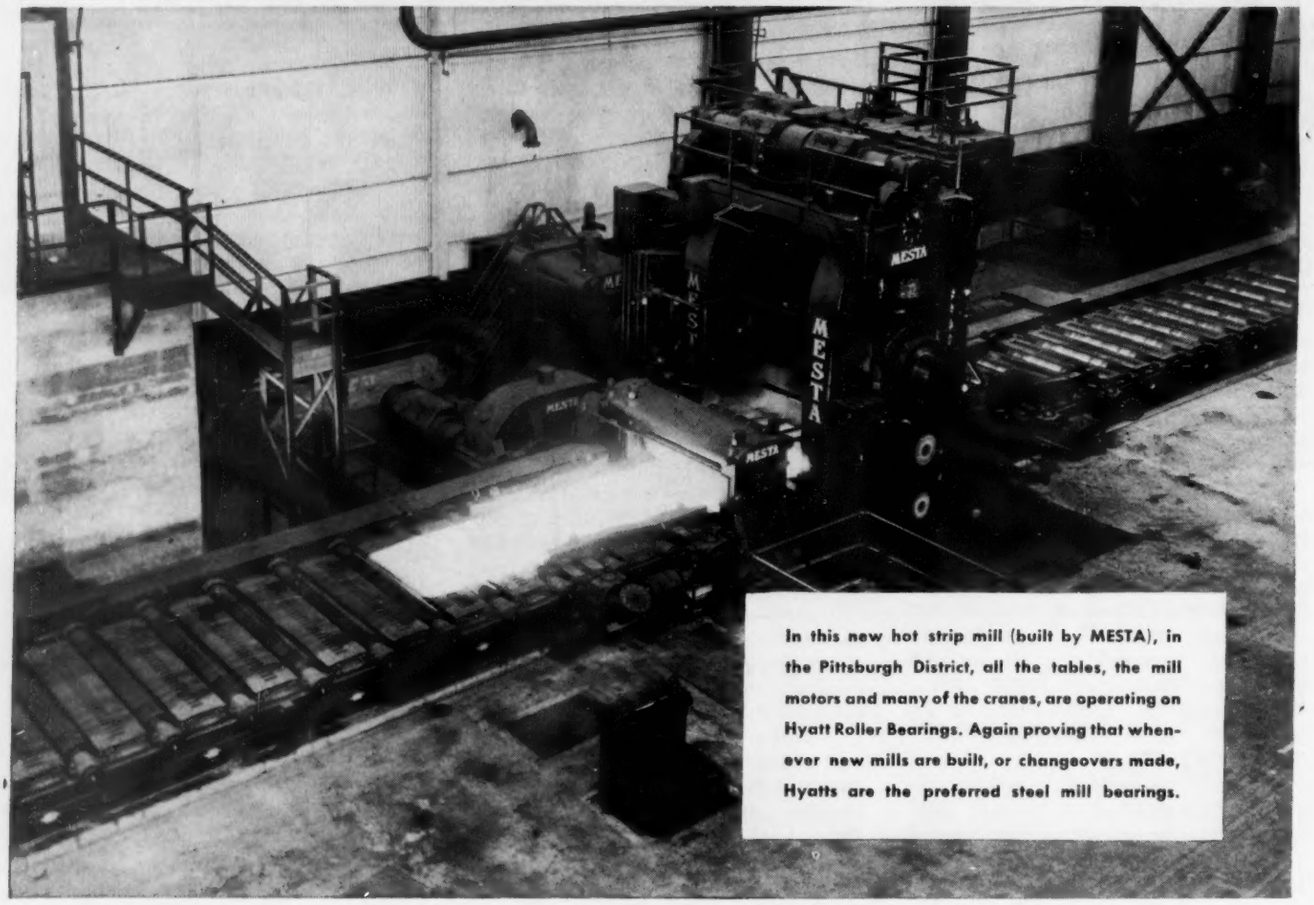

In this new hot strip mill (built by MESTA), in the Pittsburgh District, all the tables, the mill motors and many of the cranes, are operating on Hyatt Roller Bearings. Again proving that whenever new mills are built, or changeovers made, Hyatts are the preferred steel mill bearings.

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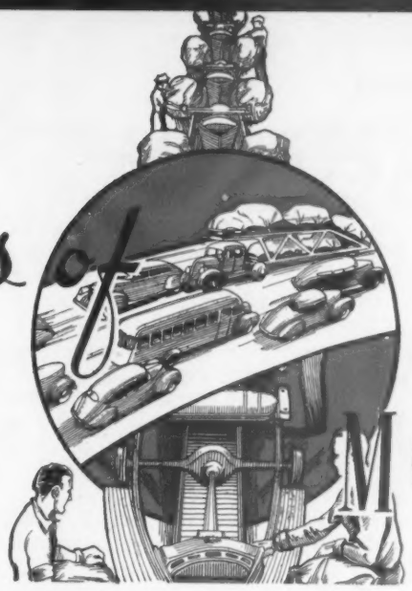
HYATT *Roller Bearings*

Mirrors of MOTORDOM



By A. H. ALLEN
Detroit Editor, STEEL

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DETROIT

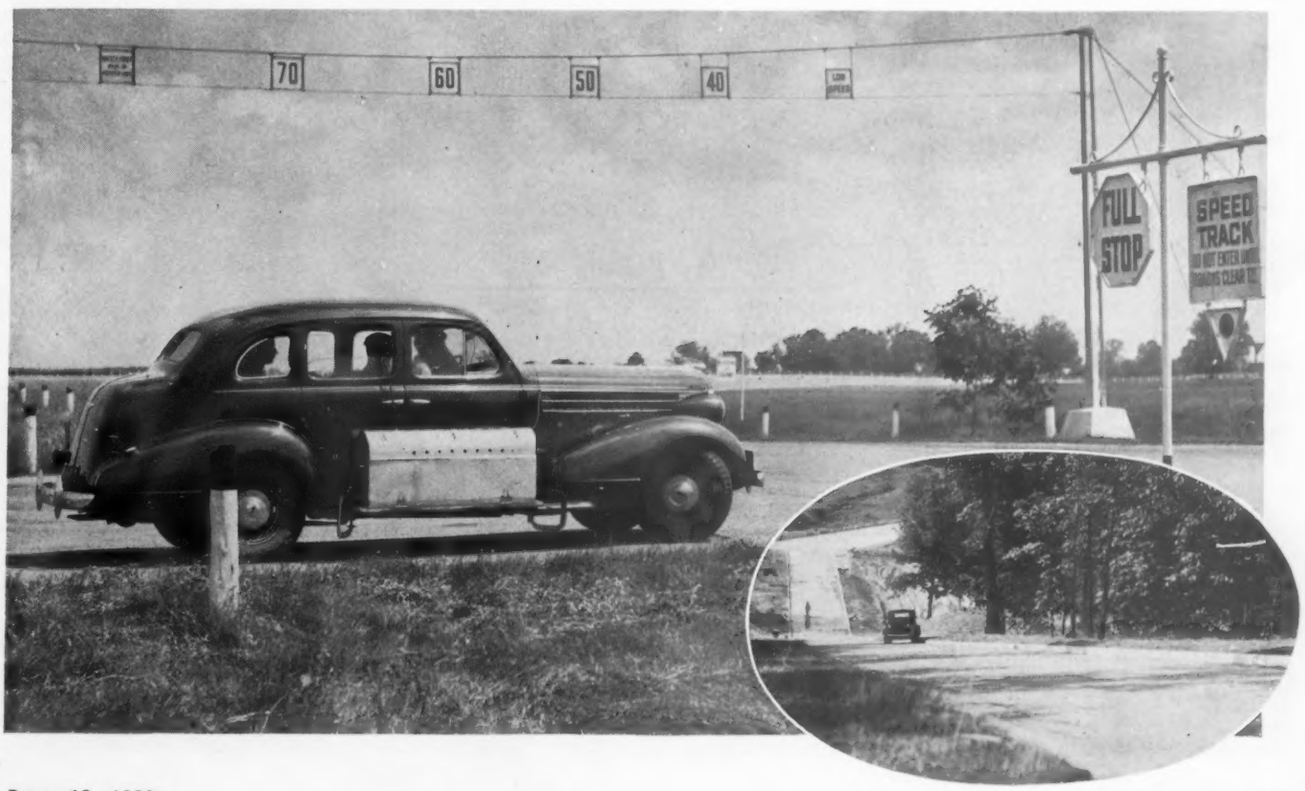
■ FINDING the facts on motor car performance, determining deficiencies or proficiencies in materials and parts going into motor car construction, and providing a measure of what the competition is doing are the special provinces of the automotive proving grounds.

Only the grueling dashes around the speed loop, up 27 per cent grades, through water and mud, and pounding over every conceivable type of pavement will provide true measures of the stuff in an automobile and of what is going to happen after the owner takes delivery of a new car.

General Motors Corp. in 1924 set up its proving grounds at Milford, Mich., a location selected because of the ideal terrain for test purposes and because of the central location with respect to the various divisions of the corporation—25 miles from Pontiac, 35 miles from Flint, 50 miles from Lansing and Detroit. At the start about $1,000,000 was appropriated to establish this field laboratory covering 1268 acres. Since that time another $1,000,000 has been added to the original investment.

Facilities at the grounds are offered to each division of the corporation free of charge, for any use they care to make of them, and an experimental garage or shop is maintained by each division. Normally there are 150 division engineers at work on the proving grounds, and a staff of an additional 175 is busy on tests for the corporation itself. All come under the gen-

Ordeals for Autos



■ **Car with test equipment entering the 3.8-mile speed loop at proving grounds. Note speed lanes indicated by overhead markers. Inset shows 27 per cent grade, steepest on the grounds and built to simulate a hill in San Francisco. Level portion halfway down represents a cross street. Average 1939 model will barely make this grade in second gear from a standing start**

eral supervision of A. J. Schamehorn, director of the grounds.

The work of the proving grounds' staff is of especial interest. Each year cars of all makes both domestic and foreign, are purchased and brought in for tests, 93 being on hand at present. They are torn to pieces, scaled, measured, weighed, reassembled and the car driven for, say 25,000 miles, and then torn down again and re-inspected. From these tests emerges a great mass of data on competitive makes of automobiles, and it is a simple matter to stack these results up against those obtained from the corporation's own cars, thus getting comparable performance statistics. But these data are kept within the close confines of key executives in the corporation and chief engineers of the various divisions. None of the results is permitted to reach or be used in any way by sales departments.

The proving grounds are located on a plot about 1.5 miles square. Main test track is a 3.8-mile paved speed loop, triangular in shape with the turns banked so that the forces in a speeding car are always normal to the pavement. Speed lanes are established by overhead markers and while drivers are not held down on speeds in the straightaways, they must keep to 80 miles per hour on the turns, although the turns are designed to be good for 120 miles per hour.

75,000,000 Miles, One Death

It is a favorite stunt of test drivers taking visitors around the speed loop to run their cars into a turn at about 80 miles per hour, then take their hands off the steering wheel, turn around to the visitor and ask for a match. This usually proves highly disconcerting, as the passenger fails to appreciate that the banking of the turn is such that a car will track perfectly around it and does not require any assistance from the driver in keeping to the lane.

In the 15 years of operation of the proving grounds during which time 75,000,000 car miles have been rolled up, only one fatal accident has been encountered, suggesting that a person is perhaps safer on the proving grounds than on the average highway, because of the careful control of all conditions in testing operations.

One straightaway on the speed loop is 1 1/3 miles in length and has been made straight and level to within 0.1-foot. A second similar straightaway is placed at right angles so that wind effect can be discounted. A 240-foot diameter concrete skid pad is used for braking and turning tests. Another portion of road may be flooded with water up to several feet deep for study of the effect of water on brakes. Another 1000-foot stretch of dirt road may be converted into mud several inches deep in 15 minutes by means of water pipes along both sides. A standard test hill 2900 feet long at a uniform 7 per cent grade is provided, as well as numerous other shorter hills with grades ranging up to the steepest, 27 per cent.

All in all, 23 miles of roads thread through the proving grounds, varying all the way from mere tracks through brush and the rough Belgian block pavement up to the modern concrete high-speed roads.

Supplementing road facilities are the shops where a score of different tests can be carried out on motor vehicles. Recently installed is a single-story sound laboratory where elaborate equipment is installed to record car noises down to the last half a decibel. Another feature here is a chassis dynamometer erected so that rollers accommodating the car wheels are flush with the roof, the car being hoisted up to the roof and rolled on the dynamometer, permitting the car to be entirely removed from the room in which instruments and recording apparatus are installed.

The proving grounds even has its own weather bureau from which regular data are obtainable on temperature, humidity, barometer, wind velocity and other factors which might exert an effect on test information from day to day.

This division of General Motors is continually "putting progress through its paces," and the searching studies made serve to keep engineers and designers of the various car divisions constantly on their toes, for they know any slips they might make will come to the surface quickly at the proving grounds and be recorded into the running history of the corporation's product.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1937	1938	1939
Jan.	399,186	227,130	353,946
Feb.	383,900	202,589	312,141
March	519,022	238,598	389,489
April	553,231	238,133	354,263
4 mos.	1,855,339	906,475	1,409,839
May	540,377	210,183	*306,000
June	521,153	189,399	.....
July	456,909	150,444	.....
Aug.	405,072	96,936	.....
Sept.	175,630	89,623	.....
Oct.	337,979	215,296	.....
Nov.	376,629	390,350	.....
Dec.	347,349	407,016	.....
Year	5,016,437	2,655,777	.....

*Estimated.

Estimated by *Ward's Reports*

Week ended:	1939	1938†
May 13	72,375	47,415
May 20	80,145	46,810
May 27	67,740	45,120
June 3	32,445	26,980
June 10	62,395	40,175

†Comparable week.

	Week Ended June 10	Week Ended June 3
General Motors	30,640	23,670
Chrysler	8,205	1,100
Ford	14,730	1,600
All others	8,820	6,075

■ SALES figures for four leading manufacturers for the month of May show an average gain of 48.4 per cent over the same month last year. Including cars and trucks, they are:

	Total for May	% Over 1938
Chevrolet	77,125	34.8
Ford-Mercury	69,816	44
Buick	19,730	42.5
Pontiac	15,760	72.3

Last year production slipped 20,700 units from May to June. This year, with May production around 300,000 units, production will suffer more appreciably, mainly as a result of the Briggs strike and its resultant tieup of Chrysler assemblies. Estimates on June production indicate assembly of around 225,000 or a drop of 75,000 from May.

An agreement was reached between the Briggs management and the striking UAW-CIO group, with the latter having won an important point in being accorded exclusive bargaining rights or effectually that through elimination of a clause in the previous contract which stipulated the union was recognized for its members only a proviso which is included in most of the contracts the UAW has with other manufacturers here.

Martin Plans New Drive

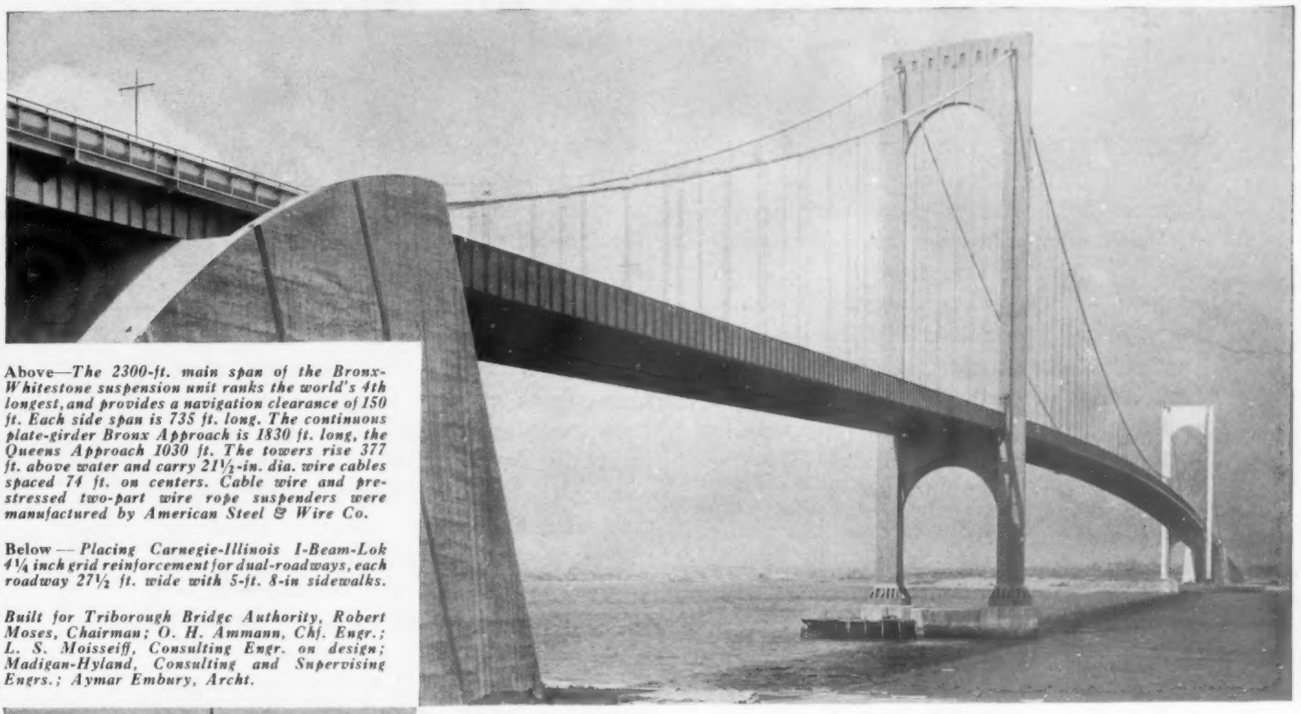
Following formal ratification of the agreement Wednesday by union members, it was expected work would be resumed speedily in the closed Briggs plants, and spokesmen for Chrysler Corp. indicated its plants would open immediately after operations were resumed at Briggs. By Wednesday afternoon, releases on stop-shipment orders were coming through, indicating that by this week closed plants would be in full swing once more.

Homer Martin's wing of the UAW has been formally re-awarded a charter in the American Federation of Labor, establishing his following now as the UAW-AFL wing in the auto industry. According to information from the Martin camp, 70,000 votes were received on the proposed affiliation, with approval being in the ratio of 20 to 1. Martin now proposes to move in on the aircraft, farm implement and tool and die industries for membership and, having the backing of the powerful AFL, he might be able to touch off a lot of fireworks with his former comrades in the CIO.

COMPLETED!

World's 4th Longest Suspended Span

—The Bronx-Whitestone Bridge



Above—*The 2300-ft. main span of the Bronx-Whitestone suspension unit ranks the world's 4th longest, and provides a navigation clearance of 150 ft. Each side span is 735 ft. long. The continuous plate-girder Bronx Approach is 1830 ft. long, the Queens Approach 1030 ft. The towers rise 377 ft. above water and carry 21½-in. dia. wire cables spaced 74 ft. on centers. Cable wire and prestressed two-part wire rope suspenders were manufactured by American Steel & Wire Co.*

Below — *Placing Carnegie-Illinois I-Beam-Lok 4¼ inch grid reinforcement for dual-roadways, each roadway 27½ ft. wide with 5-ft. 8-in sidewalks.*

Built for Triborough Bridge Authority, Robert Moses, Chairman; O. H. Ammann, Chf. Engr.; L. S. Moisseiff, Consulting Engr. on design; Madigan-Hyland, Consulting and Supervising Engrs.; Aymar Embury, Archt.

THE Bronx-Whitestone bridge, spanning the East River, is the key structure in a 5-mile express highway connecting the Hutchinson River Parkway with Long Island's high-speed traffic network. It constitutes one of the most important links in the Circumferential Parkway system which, eventually, will completely girdle New York City. For travelers between the New England states and the New York World's Fair on Long Island, it affords a traffic by-pass skirting New York City and saving a distance of some 8 miles.

The entire 1¼ mile bridge superstructure, ready for service even to the finished roadway and lighting system, was under contract to American Bridge Company. Geared to perhaps the fastest construction schedule ever attempted on a large-scale engineering project, the work was actually completed in 18 months — one month ahead of contractual obligations.

This construction performance offers striking evidence of the fact that, regardless of the size of the operation, when time is short and the utmost speed is essential to meet the exacting need of ON TIME fabrication and erection, you can count on American Bridge Company's facilities and personnel to adequately deliver.

AMERICAN BRIDGE COMPANY

General Offices: Frick Building, Pittsburgh, Pa.

Baltimore · Boston · Chicago · Cincinnati · Cleveland · Denver · Detroit
Duluth · Minneapolis · New York · Philadelphia · St. Louis

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

Editorial

Reciprocal Buying Cuts Both Ways

■ RECIPROCITY long has been blamed for many of the so-called evils in business. Many a "lost" order has been attributed to it. Small companies making a few products often declare they have no chance to compete with larger organizations producing a greatly diversified line. However, it is indicated that, more and more, sales and purchasing departments are coming to realize that reciprocity is an unavoidable factor in doing business and are facing the attendant problems squarely.

Selling is accomplished by various methods, including personal calls, advertising, direct mail, demonstrations and a fifth method, the fulfillment of mutual obligations or "reciprocity." Results from the first four methods are dependent largely upon a combination of quality, service and price.

Reciprocity, in itself is basically even more simple than the four factors previously mentioned in that it is directly traceable to the ancient principles of barter. Today, it has developed into a powerful influence in transacting business, and many condemn it as an unfair method of competition.

As Sales Argument Reciprocity Must Be Handled with Discretion

When reciprocity is used as a method of forcing a customer to buy a product of poor quality or not suited to his requirements, there is no questioning the fact that it becomes obnoxious and an obstruction in the flow of normal business. When it is used as a means of discharging friendly moral obligations, little criticism is justified

A good many purchasing agents object to reciprocity on the ground that it violates the principles of sound buying, especially when they are forced against their better judgment to sacrifice quality, price or service. The growth of the practice is indicated by the fact that many companies have set up separate departments to maintain a complete record of suppliers and use the data in influencing sales.

Tactfully handled, such data are of undeniable assistance to the salesman. Too often, unfortunately, the salesman uses reciprocity as his first argument and sometimes overplays his hand, thus unnecessarily impairing the cordial relations between two companies. The purchasing agent for a large machinery builder tells the story about the pig iron salesman who came in, seated himself comfortably, and pugnaciously declared that he wanted an order since his firm had just purchased an expensive piece of equipment. A quick examination of the records, however, revealed that the salesman's company was last on the list from a reciprocal standpoint despite the recent purchase. The salesman, of course, left crestfallen, realizing that he had overstepped the bounds of judicious selling.

Evils Tend to Self-Correction Under Stress of Competition

In the long-run, the so-called evils of reciprocal transactions tend to be self-correcting. Any legitimate business enterprise must buy the kinds and qualities of materials that are best suited for its purpose so that with its improved designs and manufacturing methods it can turn out a product competitive with those of other manufacturers in the field. If it deviates from these standards, it soon loses its competitive position and eventually fades completely out of the picture.

Reciprocity is likely to be with us as long as goods are traded although, admittedly, it is often overworked. Skillfully wielded, it may be made to produce effective results. Misused, it may be made equally effective in destroying good-will and business.

The BUSINESS TREND

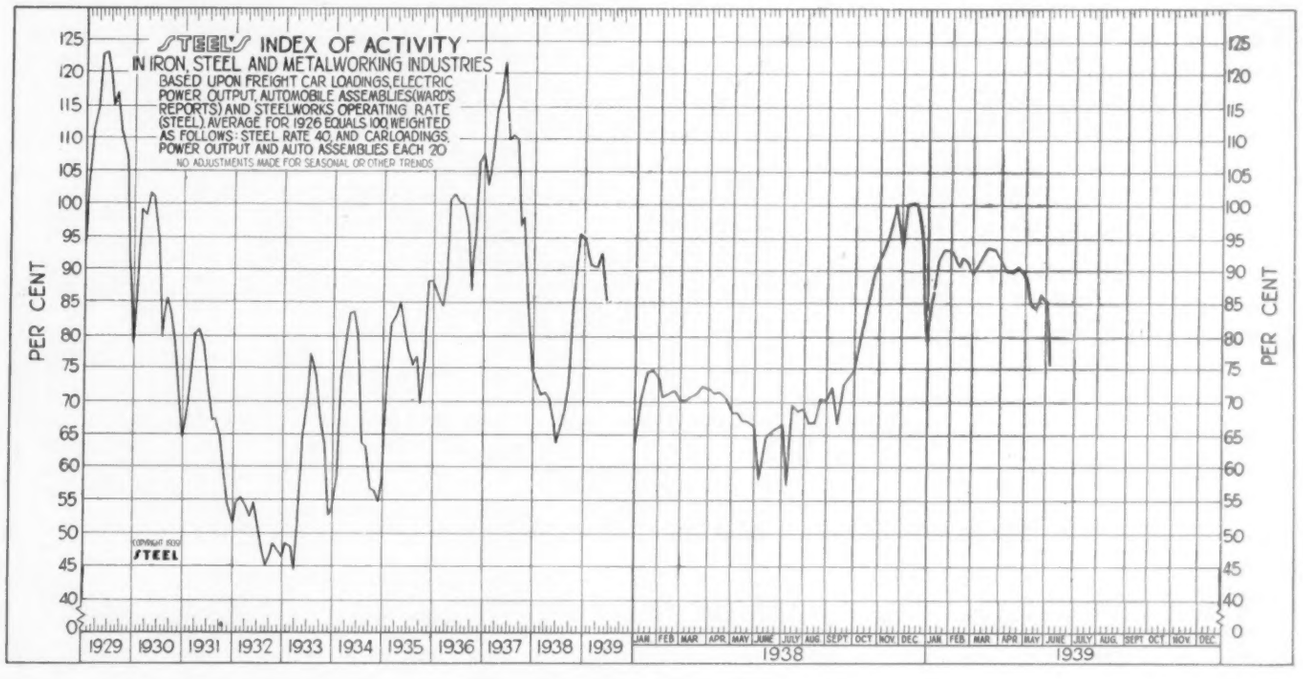
Activity Index Reflects Holiday Interruption

■ IMPROVED business sentiment has become increasingly evident the past week or two, with most industrial and financial indicators recording a favorable showing against adverse seasonal tendencies. However business developments through the next few weeks will be awaited with more than usual interest. If industrial activity can continue to hold its own, or better still register a slight upward trend during this period of normal seasonal dullness, there would be good indications that the downward tendency of the past few months has been arrested.

Records of business for the week ended June 3 are distorted somewhat by the interruption of activity occasioned by the observance of Memorial day. Due partly to this factor and the more than seasonal decline in automobile production which was accentuated by the strike at Briggs, STEEL'S index of activity declined 9.5 points to 75.9. In the comparable week last year the index eased 8.4 points to 58.1 and in 1937 the index declined 10.5 points to 105.1.

Steelmaking operations increased four points to 52 per cent for the week ended June 3, to record the sharpest advance in any seven day period so far this year. The 6.5 points increase in the national steel rate for the two weeks ended June 3 regained all the ground lost since the first week in April. The upward trend in steelworks operations was not affected by the holiday interruption, due to the custom of the industry in not observing the holiday in that particular department.

Automobile output of 32,445 units for the week ended


STEEL'S INDEX OF ACTIVITY
IN IRON, STEEL AND METALWORKING INDUSTRIES
BASED UPON FREIGHT CAR LOADINGS, ELECTRIC POWER OUTPUT, AUTOMOBILE ASSEMBLIES (WARD'S REPORTS) AND STEELWORKS OPERATING RATE (STEEL). AVERAGE FOR 1926 EQUALS 100 WEIGHTED AS FOLLOWS: STEEL RATE 40, AND CARLOADINGS, POWER OUTPUT AND AUTO ASSEMBLIES EACH 20
NO ADJUSTMENTS MADE FOR SEASONAL OR OTHER TRENDS
PER CENT
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1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939
1938
1939

STEEL'S index of activity declined 9.5 points to 75.9 per cent in the week ended June 3:

Week ending	1939	1938	Mo. Data	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Mar. 18	93.3	71.3	Jan.	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6	104.1
Mar. 25	93.2	72.4	Feb.	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2	111.2
April 1	92.2	72.0	March	92.6	71.2	114.4	88.7	83.1	78.9	44.5	54.2	80.4	98.6	114.0
April 8	90.0	71.3	April	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7	122.5
April 15	89.7	71.4	May	85.3	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2	122.9
April 22	90.4	70.8	June	....	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8	120.3
April 29	89.2	68.4	July	....	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9	115.2
May 6	85.1	68.5	Aug.	....	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4	116.9
May 13	84.2	67.2	Sept.	....	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7	110.8
May 20	86.6	67.1	Oct.	....	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8	107.1
May 27	85.4	66.5	Nov.	....	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0	92.2
June 3	75.9	58.1	Dec.	....	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3	78.3

June 3 represented a decline of over 50 per cent from the preceding week, but remained above the 26,980 units assembled in the comparable week last year. Revenue freight carloadings were off 59,942 cars to 567,732 in the week ended June 3, while electric power consumption was lower at 2,113,387,000 kilowatt-hours, compared with 2,204,858,000 kilowatt-hours in the preceding week.

Business prospects through the summer months are for a relatively small revival in activity, originating in consumer spending and aided to some extent by building operations financed directly or indirectly by the government. The investment of private capital, upon which alone a broad and far-reaching revival is based, is not yet in sight.

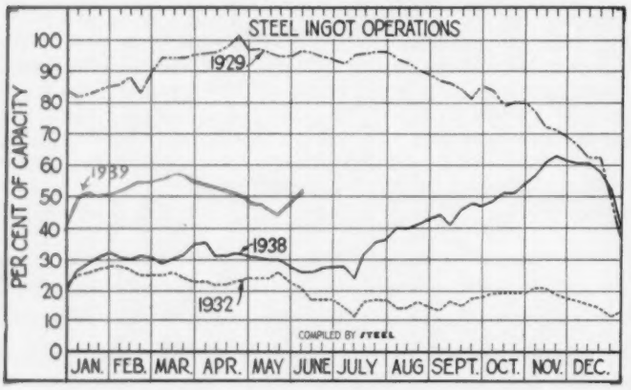
FOREIGN TRADE DECLINED IN APRIL

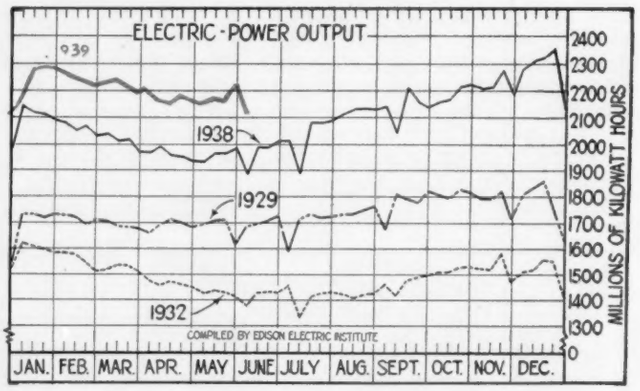
Exports during April declined from the sharply expanded volume of the preceding month. Imports were also below the March level. April exports had a total value of $230,947,000 compared with $267,602,000 in March and the $274,472,000 export volume recorded in April, 1938. Imports in April were valued at $186,195,000, slightly lower than the March total of $190,453,000. The export balance of trade in April was $44,752,000, against $77,149,000 in March and $114,645,000 export excess in April last year.

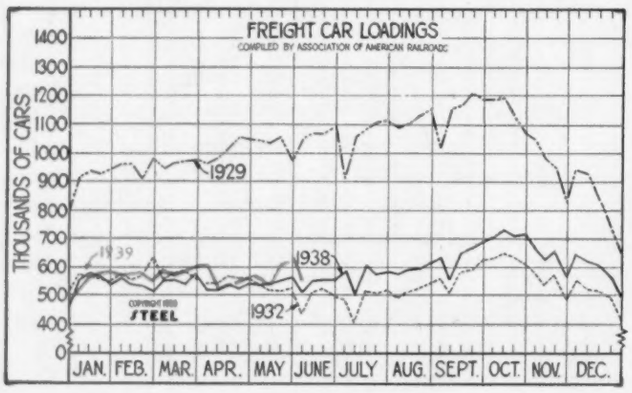
Following the general trend exports of iron and steel products declined during April. However, imports almost doubled the total for the preceding month to reach the highest level since August, 1937. Iron and steel exports including scrap totaled 394,008 tons, against 474,360 in March and 489,249 tons in April last year. Imports during March aggregated 44,083 tons, compared with 25,369 the preceding month.

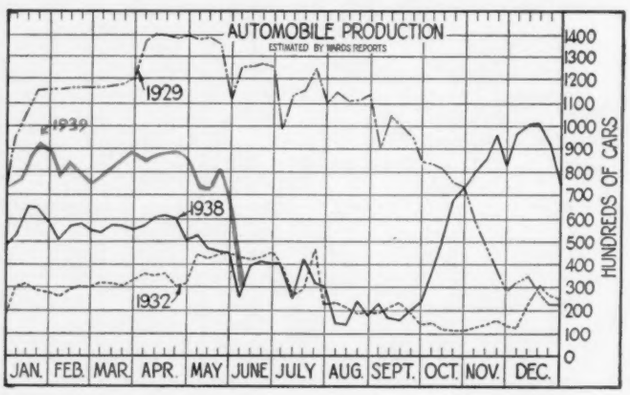
APRIL IRON OUTPUT DOWN 19.2 PER CENT

Average daily coke pig iron production in the United States during May amounted to 55,373 gross tons, down substantially from the 68,511 daily average in April. However, the May figure remained well above the 40,675 gross tons daily average in May, 1938. Total output in the first five months this year aggregated 10,400,731 tons, an increase of 51.4 per cent over the comparable period last year. Relating production to capacity operations in May averaged 40.3 per cent, against 49.8 per cent in April. The operating rate in May last year was 29.4 per cent. Number of stacks in blast May 31 totaled 107, compared with 102 at the end of April.

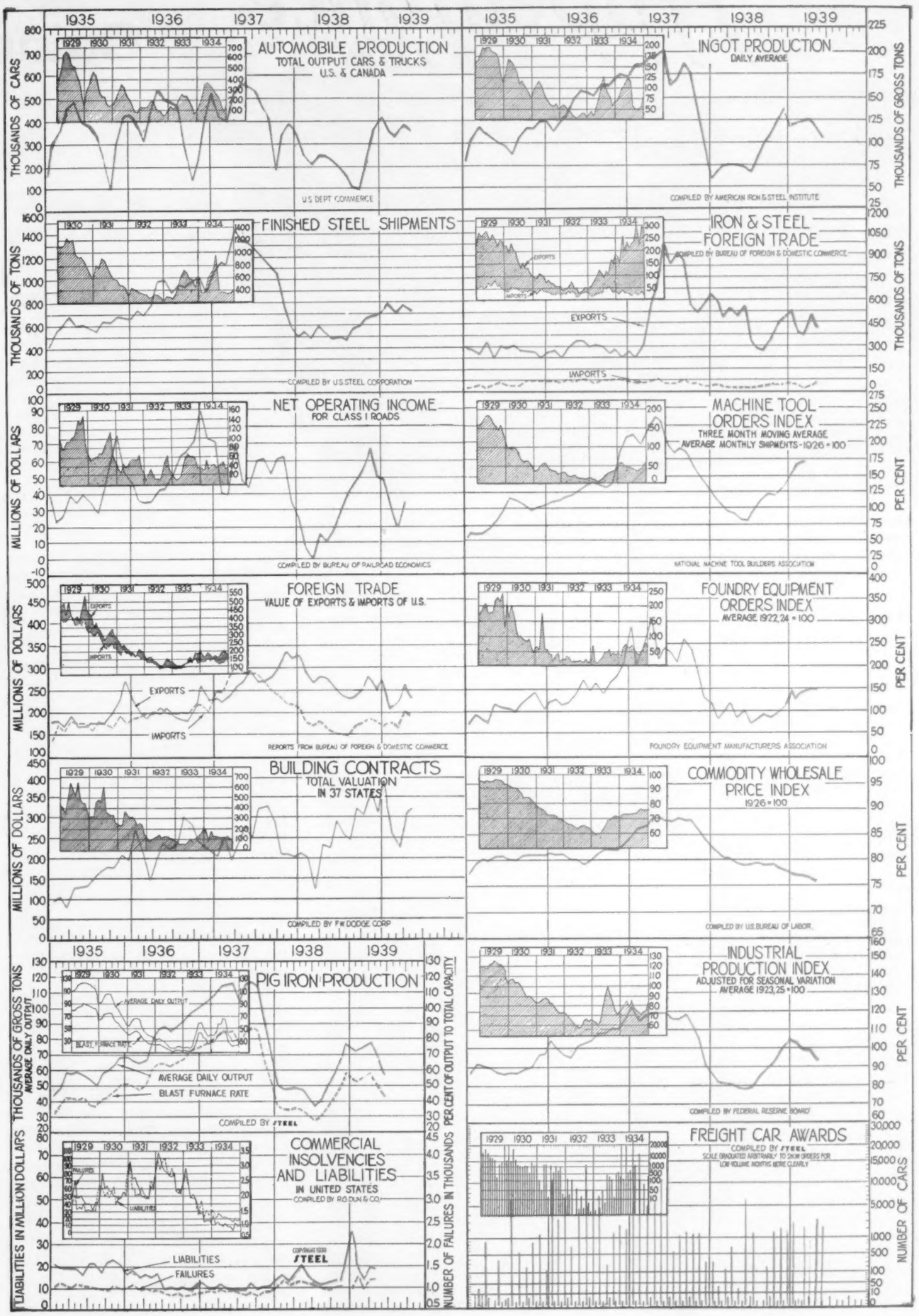








Week ending	Steelworks Operating Rate Per Cent 1939	1938	1932	1929	Electric Power Output Million KWH 1939	1938	1932	Freight Car Loadings Thousands of Cars 1929	1939	1938	1932	1929	Weekly Auto Output 1939	1938	1932	1929
Feb. 11	54.0	30.0	27.0	86.0	2,268	2,052	1,578	1,726	580	543	562	956	84,500	57,810	29,320	116,000
Feb. 18	55.0	31.0	25.0	88.0	2,249	2,059	1,545	1,718	580	536	572	958	79,860	59,100	30,410	116,500
Feb. 25	55.0	30.5	25.0	83.0	2,226	2,031	1,512	1,699	561	512	636	907	75,660	56,977	30,150	116,500
Mar. 4	56 0	29.5	25.0	89.5	2,244	2.036	1,519	1,707	599	553	560	977	78,705	54,440	31,390	116,500
Mar. 11	56.5	30.0	25.5	94.5	2,238	2,015	1,538	1,703	592	557	575	946	84,095	57,438	31,110	116,500
Mar. 18	56.5	32.0	24.5	94.5	2,225	2,018	1,537	1.687	594	540	585	958	86,725	57,558	30,590	117,000
Mar. 25	55.5	35.0	23.0	94.5	2,199	1,975	1,514	1.683	605	573	561	961	89,400	56,800	32,892	117,500
Apr. 1	54.5	36.0	23.0	95.0	1,210	1,979	1,480	1,680	604	523	545	967	85,980	57,500	25,756	120,000
Apr. 8	53.5	32.0	22.0	95.5	2,173	1,990	1,465	1,663	535	522	545	956	87,019	60,975	35,390	138,417
Apr. 15	51.5	32.0	22.0	96.0	2,171	1,958	1,480	1,697	548	538	567	972	88,050	62,021	35,778	140,822
Apr. 22	50.5	32.5	23.0	98.0	2,199	1,951	1,469	1,709	559	524	562	1,004	90,280	60.563	30,672	140,290
Apr. 29	49.0	32.0	24.0	101.0	2,183	1,939	1,445	1.700	586	543	554	1,052	86,640	50,755	31,121	139,732
May 6	49.0	31.0	24.0	97.0	2,164	1,939	1.429	1,688	573	536	534	1,050	71,420	53,385	43.899	140,672
May 13	47.0	30.0	24.0	97.0	2,171	1,968	1,436	1,698	555	542	517	1.048	72,375	47,415	42,587	138,541
May 20	45.5	30.0	25.5	96.0	2,170	1,968	1,435	1,704	616	546	516	1,046	80,145	46,810	43,470	139,528
May 27	48.0	28.5	23.0	95.0	2,205	1,973	1,425	1,705	628	562	521	1,061	67,740	45,120	45,121	136,032
June 3	52.0	25.5	21.0	95.0	2,114	1,879	1.381	1,615	568	503	447	972	32,445	26,980	44,116	111,372


AUTOMOBILE PRODUCTION
TOTAL OUTPUT CARS & TRUCKS U.S. & CANADA
U.S. DEPT COMMERCE
INGOT PRODUCTION
DAILY AVERAGE
COMPILED BY AMERICAN IRON & STEEL INSTITUTE
FINISHED STEEL SHIPMENTS
COMPILED BY U.S. STEEL CORPORATION
IRON & STEEL FOREIGN TRADE
COMPILED BY BUREAU OF FOREIGN & DOMESTIC COMMERCE
EXPORTS
IMPORTS
NET OPERATING INCOME
FOR CLASS I ROADS
COMPILED BY BUREAU OF RAILROAD ECONOMICS
MACHINE TOOL ORDERS INDEX
THREE MONTH MOVING AVERAGE
AVERAGE MONTHLY SHIPMENTS - 1926 = 100
NATIONAL MACHINE TOOL BUILDERS ASSOCIATION
FOREIGN TRADE
VALUE OF EXPORTS & IMPORTS OF U.S.
REPORTS FROM BUREAU OF FOREIGN & DOMESTIC COMMERCE
FOUNDRY EQUIPMENT ORDERS INDEX
AVERAGE 1922-24 = 100
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION
BUILDING CONTRACTS
TOTAL VALUATION IN 37 STATES
COMPILED BY F.W. DODGE CORP
COMMODITY WHOLESALE PRICE INDEX
1926 = 100
COMPILED BY U.S. BUREAU OF LABOR
PIG IRON PRODUCTION
AVERAGE DAILY OUTPUT
BLAST FURNACE RATE
COMPILED BY STEEL
INDUSTRIAL PRODUCTION INDEX
ADJUSTED FOR SEASONAL VARIATION
AVERAGE 1923-25 = 100
COMPILED BY FEDERAL RESERVE BOARD
COMMERCIAL INSOLVENCIES AND LIABILITIES
IN UNITED STATES
COMPILED BY R.G. DUN & CO.
LIABILITIES
FAILURES
COPYRIGHT 1939 STEEL
FREIGHT CAR AWARDS
COMPILED BY STEEL
SCALE GRADUATED ARBITRARILY TO SHOW ORDERS FOR LOW-VOLUME MONTHS MORE CLEARLY
THOUSANDS OF CARS
THOUSANDS OF TONS
MILLIONS OF DOLLARS
THOUSANDS OF GROSS TONS
PER CENT
NUMBER OF CARS
LIABILITIES IN MILLION DOLLARS
NUMBER OF FAILURES IN THOUSANDS
PER CENT OF OUTPUT TO TOTAL CAPACITY

Appearance Gains

By
GUY HUBBARD
Machine Tool Editor

Styled by a well known industrial designer working in collaboration with the chief engineer and his staff, this new Cleveland single spindle automatic embodies numerous engineering improvements in a unified and distinctly pleasing assembly

■ WITHIN recent years the term "streamlining" has been greatly overworked. While vividly descriptive of modern mechanisms which in line of duty must "pass through the air (or water) with the greatest of ease," it hardly fits a heavy industrial machine which spends its productive life bolted to a concrete foundation. The foregoing does not in any way imply, however, that efforts of industrial stylists toward dressing up stationary industrial equipment, have in any way been misapplied. Quite the opposite is true. Consider for instance, what modern styling is accomplishing for the machine tool industry.

Since the National Machine Tool Show of 1935, a rising tide of interest in styling has been apparent among machine tool builders. This has been aroused to no small degree by the efforts of several able professional stylists who have penetrated this rather conservative industry from the outside.

It should be remembered, however, that this matter of "appearance" as a factor in machine tool design is not altogether new to the industry. Deliberate styling actually was carried to extremes in the earliest days of the industry. Back in the 1840's studied efforts were made to design machine tools to look like Grecian temples. Such efforts were of course as misdirected as would be efforts today to design them to resemble the Trylon and the Perisphere. At the same time, however, and thence down through the most important formative years of the industry, a number of its most notable pioneers proved themselves to be not only good mechanical engineers but they also demonstrated remarkable faculties for materializing their sound engineering into pleasing physical forms.

The principle upon most of these men worked was that "what looks right is right." They kept in mind above all else that a machine tool is a machine intended to enable workmen to turn out more and better work more comfortably than they could with hand tools. Therefore, it must be designed to fit the average workman as far as controls and loading and unloading the work are concerned. It should be safe to operate. It should be easy to adjust, lubricate and clean. It should not be too expensive to build.

First Steps in Styling

These designers therefore studied the location of the controls—sometimes standing in front of a full-size drawing actually to get the feel of them. They made their castings with flowing curves and neatly rounded corners, which actually cut their cost in many cases and did away with bruising and cutting the operator on sharp corners. The machine thus became easy to wipe up and the operator was inspired to take better care of it—which in turn meant better work from the machine.

The nature of the old-time machine shops, however, was not very favorable toward showing up the fine points of its equipment as far as appearance was concerned. The shops were inclined to be dark—a condition which was aggravated by forests of belts and a wilderness of countershafts. There was not much tendency toward neat group arrangements of machines, and often they were hidden by numerous pillars. Neither was the old-time machine tool catalog or advertisement—with its harsh, angular wood cut illustrations—inclined to emphasize fine points in appearance.

With the advent of electric lighting, electrical drives, plant departmentalization and modern factory buildings, the short-comings of poorly designed machinery began to become much more readily apparent to buyer and seller alike. This condition was made still more strongly apparent when catalogs and advertisements began to have finely finished photographic illustrations.

It is difficult to say who began to shout the earliest and loudest for better appearing tools—whether it was the user, the machine tool salesman, or the advertising expert. In any event, at the close of the world war heavy pressure began to be put on machine tool engineers to clean up their designs. The advent of electrical drive and control helped this cause very materially and later on hydraulic features did likewise.

When certain companies launched designs of notable smoothness during the late 1920's and early 1930's the shortcomings of some of the older, angular and unduly "bulgy" machines became painfully noticeable—through comparison—as the newer and smoother equipment be-

Recognition as Key Factor in

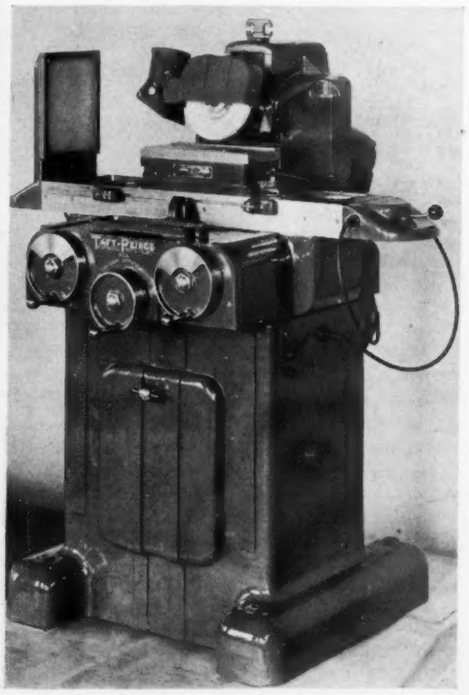
MACHINE TOOL MARKETING

gan to be installed. It was then that professional stylists really began to make headway in selling their services to the machine tool industry. Today they are practically "taken for granted", just as is the electrical or hydraulic expert.

The illustrations accompanying this article have been selected to show some good commonsense styling as practiced in the American machine tool industry today. At the upper left hand corner of facing page appears the new Cleveland single spindle automatic, as styled by Wilbur Henry Adams, working in co-operation with Chief Engineer J. C. Wattleworth and his staff. Note the conveniently located controls and built-in instrumentation.

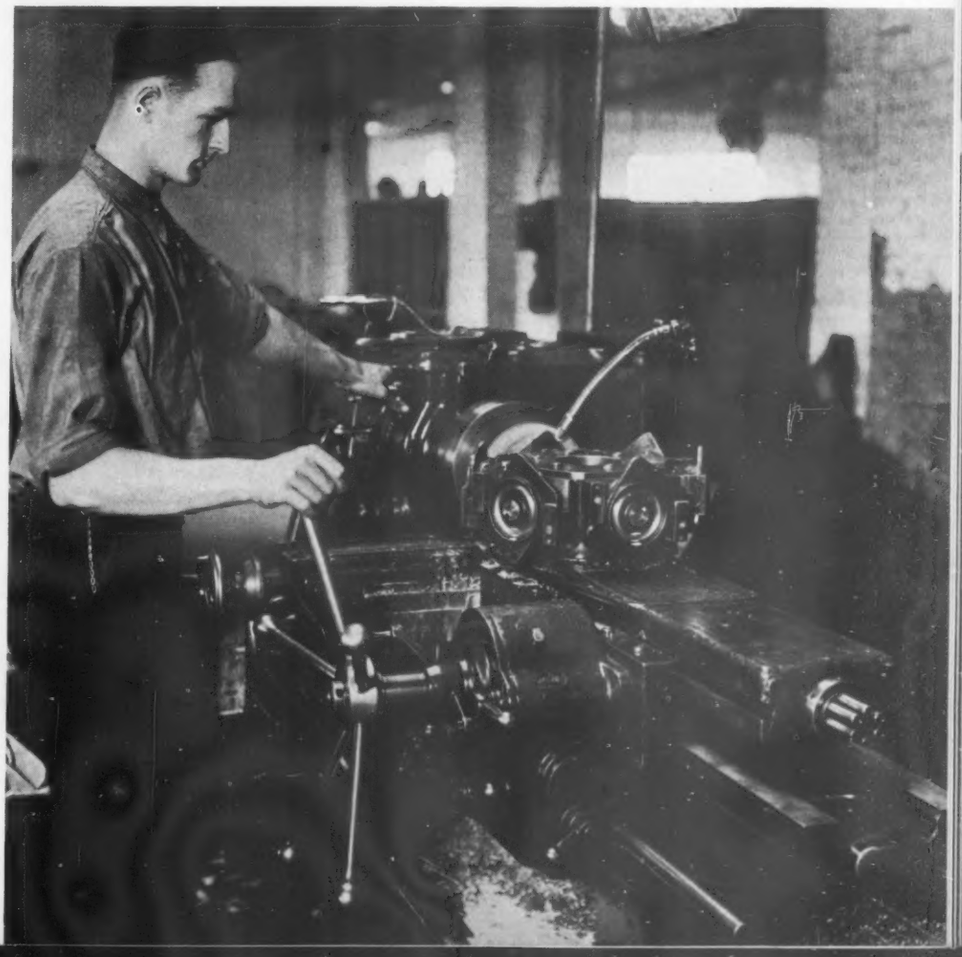
At the center of these pages appears a precision surface grinder which has just been introduced by Taft-Pierce Mfg. Co. In this the monotony of the familiar cabinet base has been relieved in a simple but effective vertical strips. This machine is mounted on rubber—hence the generous size of its supporting members. The large hand wheels are also functional—the elevating wheel reading to .0005-inch and the cross feed wheel to .001-inch, with graduations on their peripheries fully 3/16-inch apart for easy reading.

The illustration at the lower right has been selected primarily to show good functional design, although the machine has been carefully designed for appearance as well. Note that the location of the control levers is such that operation of this machine —which is a Gisholt ram-type universal turret lathe—is just about as near "effortless" as anything of this kind can be. This is indicated by the entirely natural "stance" of the operator. Incidentally, a very interesting job is going on here. The parts, drop forged caster top plates, are chucked in fixtures on the turret faces instead of on the spindle. The tools, which are held in a three-jaw scroll chuck on the spindle, machine the stationary parts at the rate of 100 per hour as they are whirled against them by the rapidly revolving spindle.



Usual monotony of a cabinet base is effectively relieved on Taft-Peirce surface grinder by simple vertical strips

Operator of this Gisholt ram-type universal turret lathe holds perfectly natural "stance" because in its designing, care was taken to "fit the machine to the man" through natural location and motion to its controls and operating levers

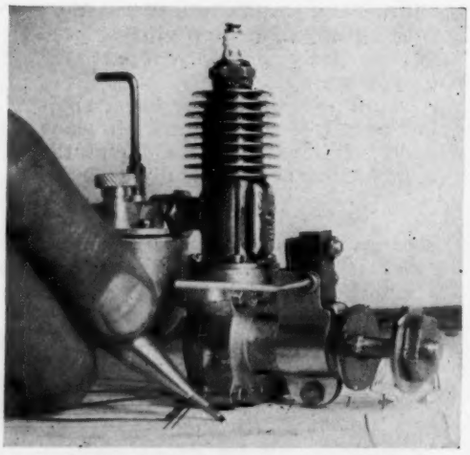


Midget Gasoline Engines

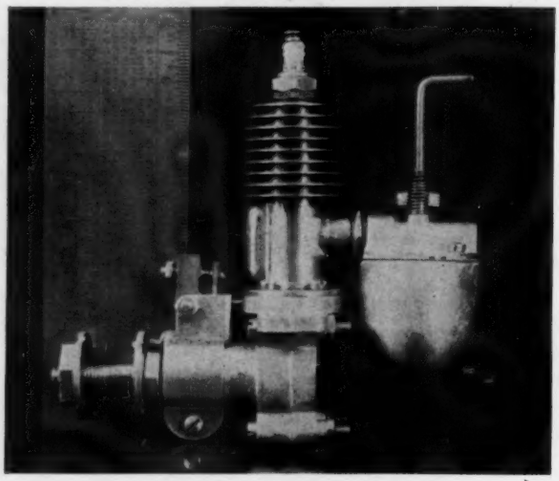
Ingenious combination of aluminum die castings and copper brazed steel produces a 1/8-horsepower tiny gasoline engine with speeds from 1000 to 8000 revolutions per minute. Total net weight is only 3¾ ounces

■ MANUFACTURE of commercial-type power units and machinery on a toy scale has grown from a novelty to a full-fledged industry. Railroad locomotives, steam engines, power shovels and numerous other mechanical units have been copied faithfully in miniature to satisfy the demands of hobbyists and mechanically minded children. One of the latest achievements in this field is the construction of small gasoline engines to drive model airplanes and boats.

Building a single-cylinder gasoline engine weighing 3¾ ounces may sound relatively simple, but it has involved extensive research and development of new materials, methods and even complete new tools. By an ingenious combination of aluminum die castings, copper brazed steel and a remarkable simplification of design and assembly, Syncro Devices Inc., Detroit, has perfected a new type of gasoline engine rated at about ⅛-horsepower, with speeds from 1000 to 8000 revolutions per minute and a total weight of 3¾ ounces. A description of how this engine is designed, how the parts are produced and assembled is a tribute to what can be accomplished with modern materials, methods and equipment. Essentially, the engine comprises the following parts: Cylinder assembly; crankcase, split vertically, with main bearing in one half; crankshaft and propeller hub; combined carburetor and gasoline tank; connecting rod and piston assembly; commutator for ignition make-and-break; cam to actuate commutator; spark plug; piston rings; gaskets, washers, assembly bolts, nuts, etc. Cylinder assembly comprises four parts, all of steel. Barrel itself is of S.A.E. 1112 steel, machined from a solid bar, with six cooling fins at the top and a flange at the base for bolting to the crankcase. Fin and flange diameter is ⅞-inch, outside diameter of the barrel is 9/16-inch, bore is ½-inch, overall length without head is 1½ inches. To permit broaching the bore, the cylinder head, drilled and tapped for the ¼-inch diameter spark plug, is made separate on a screw machine and is threaded into the finished cylinder barrel after broaching. After the cylinder is machined, it is drilled with four 7/64-inch holes in the flange, and four pairs of 5/64-inch holes in the lower part of the barrel for intake, exhaust and bypass ports. Two pairs of bypass ports are on one side of the barrel, diametrically opposite the intake and exhaust ports. Bypass ports are covered with 0.020-inch stamped steel cover plate, ¾ x ½ inch, and curved

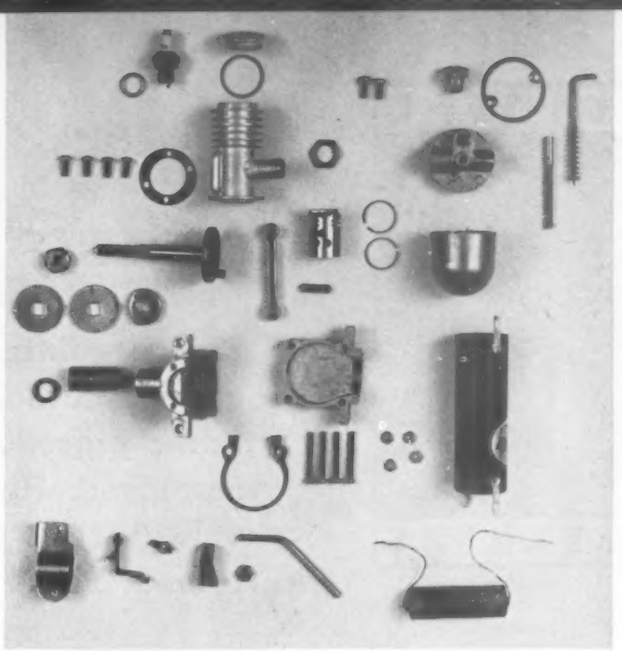


View from front of engine showing its small size compared with man's fingers. Commutator is mounted on crankshaft boss, with handle for control of timing and gap between points. Side view is shown below



to the contour of the barrel. Over the intake ports and just below the exhaust ports is placed an intake fitting, 5/16-inch in diameter, made on a screw machine and threaded to receive the carburetor and gas tank assembly.

Bypass cover plate and intake fitting first are spotted by tack welds. A fine copper wire is laid around the periphery of the cover plate before welding; a small slug of copper is dropped into the intake fitting and the assembly then is passed through a copper brazing furnace at 2025 degrees Fahr. The copper melts and flows around the joints, making them secure. Parts placed on trays travel through the electrically heated brazing furnace on a wire mesh belt, the brazing operation requiring about 50 minutes. Furnace atmosphere is reducing, prepared in a DX generator. The cylinder assembly is given a final cadmium plate on the exterior for corrosion resistance.



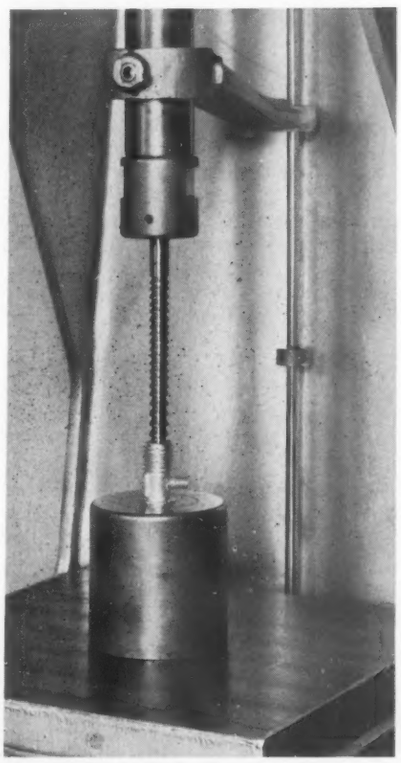
Complete layout of all parts required in assembly of engine. Also shown are spark coil and condenser which are wired into ignition circuit when operating. Stampings, die castings and screw machine products comprise the various metal parts

Die Cast Crankcase

Crankcase comprises a front and back half, both aluminum die castings. Flanges at top receive cylinder barrel and mount engine when in operation. Inside of crankcase is circular, slightly larger than the disk attached to the end of the crankshaft which carries the pin on which the connecting rod rides. Diameter of the crankshaft chamber is 15/16-inch width ¼-inch. A gasket fits between the two halves to make the assembly airtight.

Front half of crankcase carries crankshaft bearing in a ½-inch boss which extends 1 inch beyond the outside of the casting. Bearing is ¾-inch long, ⅜-inch outside diameter and accommodates the ¼-inch diameter crankshaft. Bearing is an Oilite prelubricated type of compressed and sintered copper. A 3/16-inch fiber retainer washer fits in outer end of boss.

Crankshaft is S.A.E. 1020 steel, 1⅞ inches long with a 3/16-inch thread extending back ½-inch on one end to receive the propeller assembly. Immediately back of this threaded portion is a squared section, 3/16 x 3/16 which receives a stamped steel cam that actuates the commutator. Other end of crankshaft terminates in a machined steel disk, ⅞-inch in diameter and 3/32-inch thick, which carries a ⅛-inch steel pin set in a hole, 1/16-inch from its outer edge. Pin is copper brazed into disk and disk is copper brazed onto the shaft. After brazing, crankshaft is hardened by immersion for 20 minutes in a bath of liquid cyanide at 1450 degrees Fahr. and quenching in oil. Surface is file hard to a depth of about 0.006-inch. Bearing surface is centerless ground to remove 0.002-inch of stock before assembly.



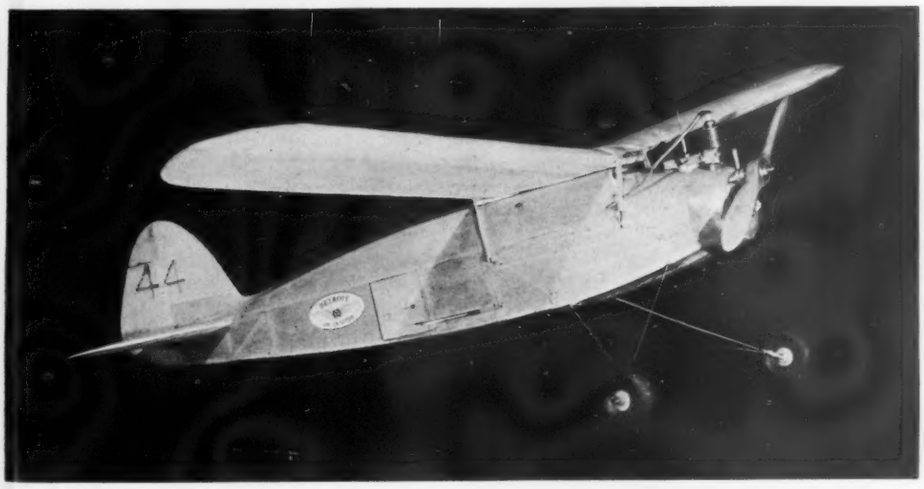
Broaching cylinder of midget engine (left)

Carburetor and Tank Combined

Carburetor and gas tank unit is a cup-shaped affair, 1 inch in diameter and about 1½ inches deep. It comprises a die cast aluminum bowl onto which is bolted a die cast aluminum top carrying a brass tube extending to bowl bottom. Upper portion of this tube cuts across the intake passage which is tapped to be attached to the cylinder intake fitting. A small hole is drilled through the brass tube at this point and a needle valve arrangement is obtained by using a pointed steel wire threaded into upper end of tube. This wire works against a small spring and its adjustment controls flow of gasoline and thus engine speed.

A second 7/32-inch tapped hole at

(*Please turn to Page* 62)



Model airplane equipped with midget gasoline engine. Photo courtesy Ed Manning, Detroit

Welding Galvanized Sheet

Fusion welding of galvanized material need not cause increased corrosion if properly done. Same procedure as with uncoated material is employed. However, a number of factors are involved if the most satisfactory job is to be obtained. These are detailed and their importance explained

By J. F. GALBRAITH
Service Engineer
The Linde Air Products Co.
New York

■ WELDING has been recognized as an increasingly important method of joining galvanized metals in the fabrication of galvanized metal piping, vessels, tanks and containers. Here oxyacetylene welding offers a method of fabrication having speed and economy, and producing a permanent joint.

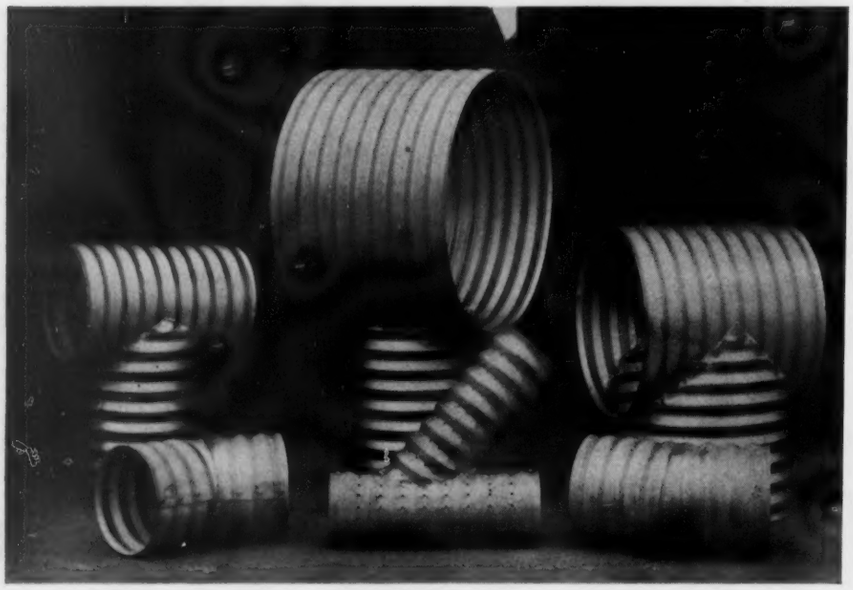
When working with galvanized sheet, metal fabricators have found that the strength and simplicity of the welded joint enables them to make many improvements in the design and construction of their products as well as in the finished product itself. For example, metal containers formerly were made with lock-seam and solder construction. Thickness of metal used was limited to 20 gage because of the great difficulty in making a lock seam with heavier gage metal. The welded seam puts no limitations on metal thickness and permits the designer to specify the weight best suited to the eventual use of the container. In addition, the finished container is stronger and there is no chance of seams opening up due to rough handling during shipment or service use.

In the construction of galvanized piping systems, welding again has many advantages, such as flexibility of design, speed and economy of installation, and permanence. In contrast to the older method of mechanically joining the pipe by means of threaded fittings. the welded joint effects no reduction in wall thickness. Although some of the galvanized coating is removed by the welding flame, this in no way exceeds the amount removed by threading. Furthermore, welding can actually increase corrosion resistance of the ungalvanized metal in the small zone where galvanizing is removed, since heat of the welding flame appears to cause formation of a highly resistant metal oxide.

Leave Coating Intact

In preparation for welding, all dirt, grease and oil along the joint should be removed but the galvanized coating should be left intact. Galvanized pipe can be beveled by the cutting blowpipe since experience has shown that this does not seriously affect the coating. In welding heavy objects or complicated shapes, jigs and fixtures often are used to assure correct alignment.

Galvanized materials can either be fusion welded with steel welding rod or bronze welded. As bronze welding is done at a lower temperature, it has less effect on the galvanizing than fusion welding. Welding technique for both fusion welding and bronze welding galvanized material is exactly the same as for the corresponding uncoated material, whether sheet or pipe. Welding should, of course, be done with the minimum amount of heat consistent with good fusion, in the case of fusion welding, and with cor-



Oxyacetylene welding played an important part in the fabrication of these culvert specials

rect "tinning action" when bronze welding.

In the construction of galvanized steel piping systems, it is important to note that the Lindeweld method of joining pipe produces a considerably narrower band of zinc volatilization compared with full fusion welding, due to greater speed and reduced heat requirements of this process.

As a protective coating, fusion welds in galvanized material sometimes are given a coat of aluminum paint. Obviously, it is not possible to paint the inside of a welded pipe joint, but experience has shown that such joints give perfectly satisfactory service even without painting. Bronze-welded joints give excellent service without any finishing. For some products, it may be desirable to coat the finished bronze weld with aluminum paint to give a uniform appearance.

Of the factors affecting the welded galvanized joint proper flame control is of first importance from the operator's standpoint because upon it depend other factors leading to a high quality job. Proper control of welding flame will result in just enough heat input to assure a sound weld. Every unit of heat put into the weld in excess of the quantity actually needed means just so much coating unnecessarily removed.

Knowledge of the correct procedure enables the operator to make a sound weld as he goes along without coming back to reheat and rework certain parts of the finished weld.

Avoid Reheating

Importance of proper heat input and avoidance of reheating the weld cannot be overemphasized. Every effort should be made to proceed in as continuous an operation as possible. When making a bronze weld, the necessity for stopping every now and then to dip the welding rod in flux may result in too many interruptions, and unless the operator is careful, too much heat may be applied. A method of reducing the number of these interruptions is to heat a sufficient quantity of bronze rod prior to the welding operation and roll it in flux which will adhere to the rod to form a flux coating. Then only interruption will be to pick up a new rod.

Next most important factor affecting quality of the welded galvanized joint comes under the province of the designer. Results obtained in the fabrication of galvanized metal products by welding vitally depend upon the specifications that come from the design room. The designer has quite a wide latitude in which to work, but his activities must be limited by certain important considerations.

When drawing up plans for constructing galvanized metal products by bronze welding, the designer should avoid application of bronze on highly stressed areas since the presence of these stressed areas may result in intergranular penetration or cracking of the base material in that vicinity. Proper choice of joints permits the welding operation to be made quickly and smoothly.

Choosing sizes of metal parts to be joined so equal heat application can be obtained is important. When unequal thicknesses are joined, the galvanizing on the smaller thickness may be volatilized considerably before the heavier thickness has been raised to tinning or fusion temperature. When cast iron and sheet are being joined, it is advisable to preheat the casting so both parts can be brought to welding temperature simultaneously.

Use of proper jigs also is important. Jigs designed for welding galvanized metal should embody, whenever possible, some means of quickly conducting heat away from the welding zone. In addition, they should provide the operator with maximum space and freedom of movement.

Watch Welding Fumes

Welding on galvanized metal should be done in well ventilated locations wherever possible as inhalation of zinc oxide fumes released from the galvanized coating may cause temporary discomfort if inhaled in sufficient quantities by the worker. Certain precautions should be followed. Out of doors the operator can usually work so the fumes float away from him. In fairly open indoor locations, it usually is sufficient to remove the fumes by suction or to drive them away from the worker with a stream of air. However, in more

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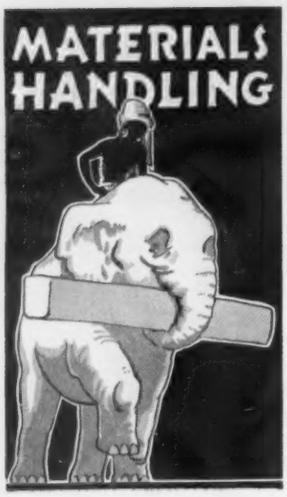
Bronze welding a longitudinal seam in a galvanized iron container. Jig holds edges in alignment



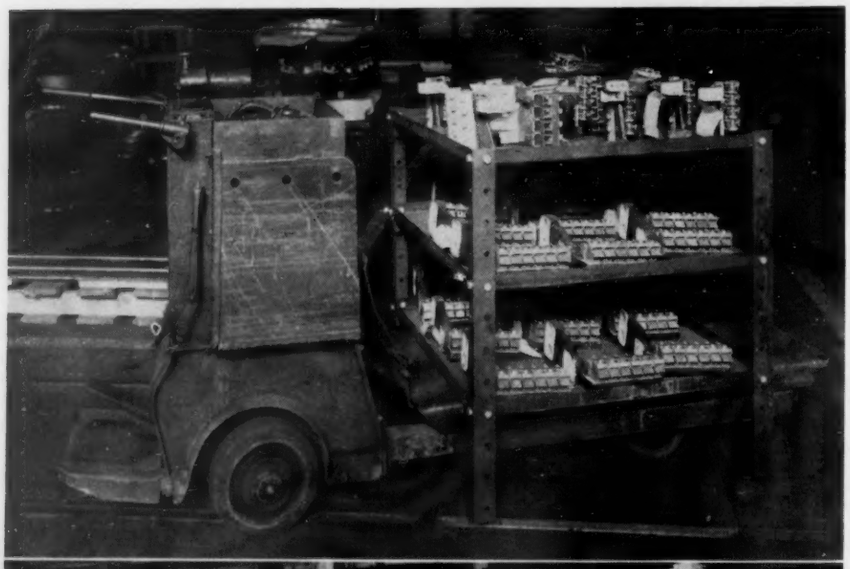
Pallets and Trucks

Important savings are shown possible, even where items handled are comparatively small in size and few in number. Use of double-faced pallets increases handling efficiency, prevents damage to material, greatly facilitates storage and delivery operations

By R. Van HUYSEN
General Planning Dept.
General Electric Co.
Schenectady, N. Y.

■ MASS production is not necessary for the reduction of materials handling costs. Although perhaps the largest savings can be obtained where mass production is involved, many possible handling improvements may be ignored due to the erroneous idea that "there is not enough in it to pay." The experience of General Electric Co. indicates that it is extremely worthwhile to pay attention to even small improvements. The following examples serve to illustrate this point.

When the fork truck was first introduced in General Electric plants, it was used in departments for handling large quantities of material, such as in the refrigerator department. Later it was decided to try and adapt this type truck to departments where small quantities of light materials were handled. One of these departments was the large motor-generator division where the fork truck has been tried out for handling brush holder assemblies and other miscellaneous items. It has given extremely gratifying results.



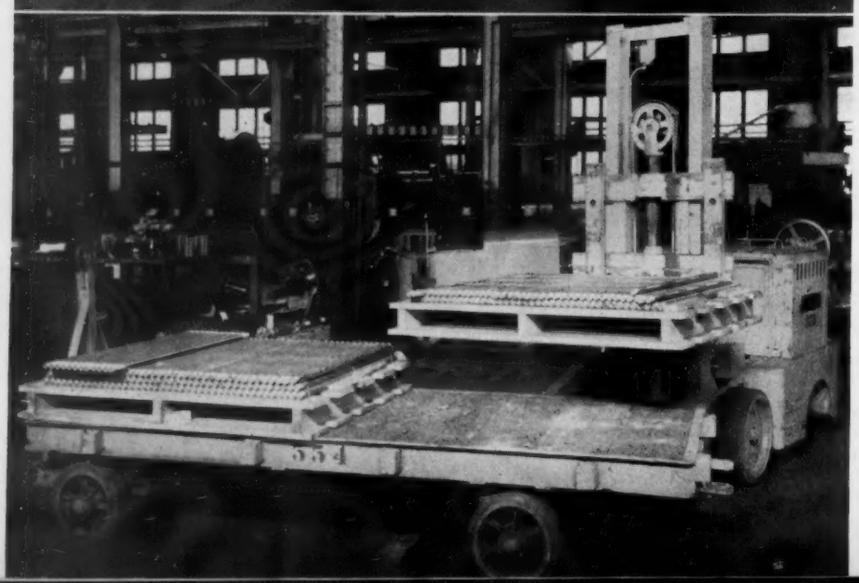


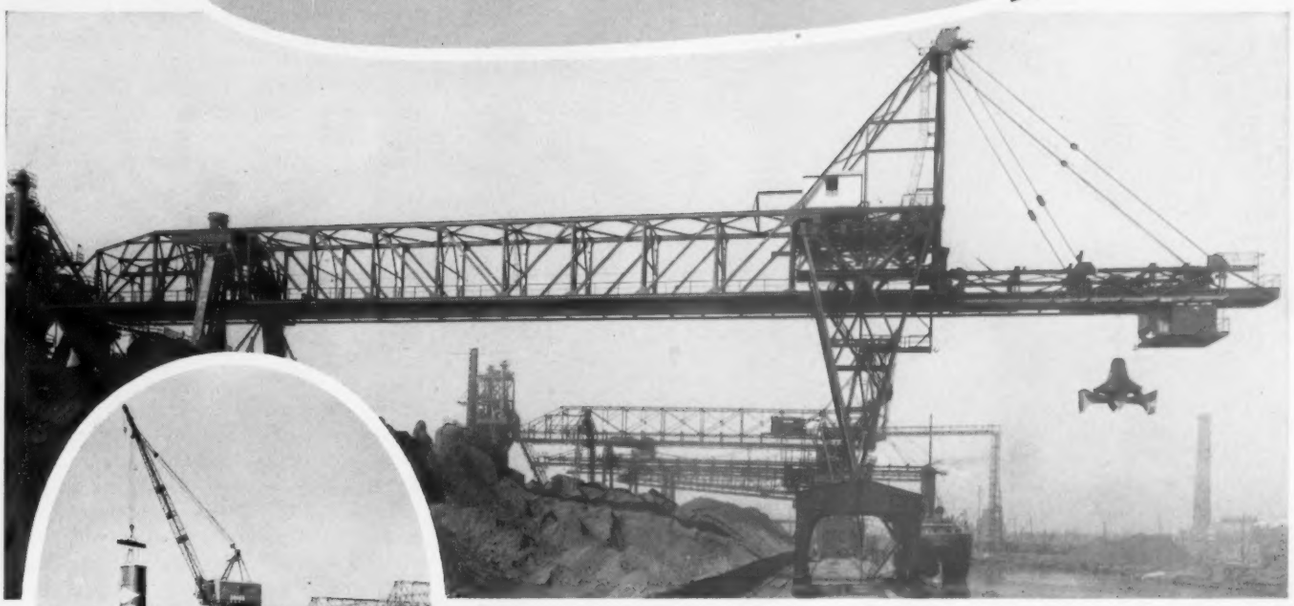
Fig. 1. (Upper)—Special skid constructed for handling brush-holder assemblies by means of a battery-operated truck. Units are handled from make-up bench, to stock, from stock to assembly floor and on by crane to motor-generator set—all in a group. Fig. 2. (Lower)—Group of rotor rim bolts loaded on pallets, one of which is on trailer. Another is on fork truck ready to be placed on trailer

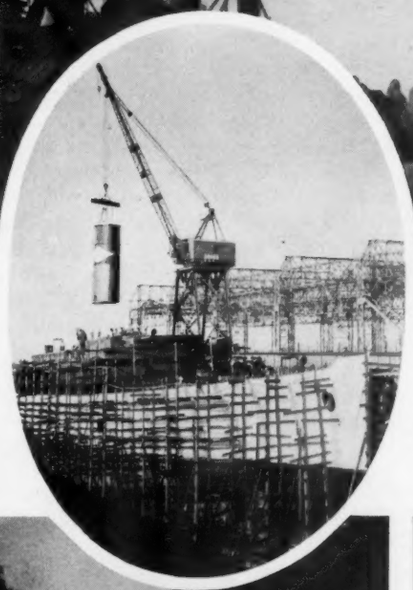
Parts Rehandled Six Times

A brush holder when completed on the assembly bench weighs from 60 to 90 pounds. Prior to using fork trucks, the brush holders were placed on a trailer, one by one, and moved to the stockroom and placed on stockroom shelves, one by one. When a motor-generator set was being assembled and an order was received for brush holders, they were again, one by one, removed from the shelves, placed on a trailer and transported to the motor-generator set. At that point the crane lifted them, one by one, to the assembly platform. By following this route, the brush holders were handled individually six times.

As the first step in attacking this

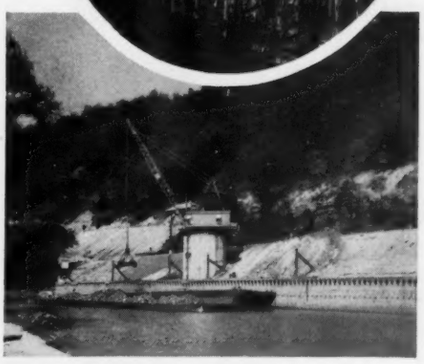
MATERIAL HANDLING and ASSEMBLY EQUIPMENT by DRAVO





1 Great flexibility for handling ore cargoes from ship to dock is provided in this bridge built by Dravo for Great Lakes Steel Corporation. 350 feet overall, it has a central span of 187 feet, carries a 10-ton bucket. Apron hoist provides clearance for steamer masts.

2 This Dravo-built whirler handles large pre-assemblies at the Newport News Shipbuilding & Dry Dock yards. Its tested capacity was 55,000 lbs. at 62 feet, 7½ tons at 115 feet radius. Separate motors on each hoist allow for operation of all motions simultaneously. Full electric control results in elimination of mechanical frictions and brakes, provides for safe handling of heavy loads over shipyard workmen and insures against damage to heavy machinery or the hull.



3 Five tons of coal from ship to shore in 32 seconds! This dock has ample barge capacity to insure uninterrupted operation. The rig is simple but fast. The Dravo whirler with a 5-ton bucket makes a complete cycle from barge to shore and back to barge in 32 seconds. Pittsburgh Coal Company's Smith Ferry Dock enjoys an unusually low handling cost per ton of coal through the use of this equipment.

4 Two barges abreast can be unloaded with this straight line coal unloading plant built by Dravo for the Pittsburgh & Lake Erie Railroad Company. A 7-ton bucket with fast travel handles 4,000 tons in eight hours from barge to cars and has a free digging capacity of 700 tons per hour. Plant is stationary and a shifting device controlled from the operator's cab moves barges along as unloading progresses.

5 This bridge now does more work than two! At Superior, Wisconsin dock of Pittsburgh Coal Company, two 6-ton coal bridges were being operated. By skillfully designing a man trolley of aluminum, Dravo raised the capacity of one bridge to 12 tons, greatly increased the speed of travel without overstressing the structure. Operating costs were reduced by eliminating the use of the second bridge.

Whether the problem is one of modernizing old equipment, replacing obsolete handling machines or designing special facilities to meet new problems, consultation with Dravo Corporation may prove to be of great value to you.

Added to its ability to fabricate and erect structures such as are shown here, Dravo Corporation has had years of experience building docks, retaining walls, plant foundations—everything that enters into the problem of terminal facilities.

Bulletin 403 describes Docks, Mill Foundations and Terminal Equipment. Bulletin 202 describes Revolving Cranes. Either will be sent upon request. Inquiries relative to specific problems may be addressed to

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ENGINEERING WORKS DIVISION

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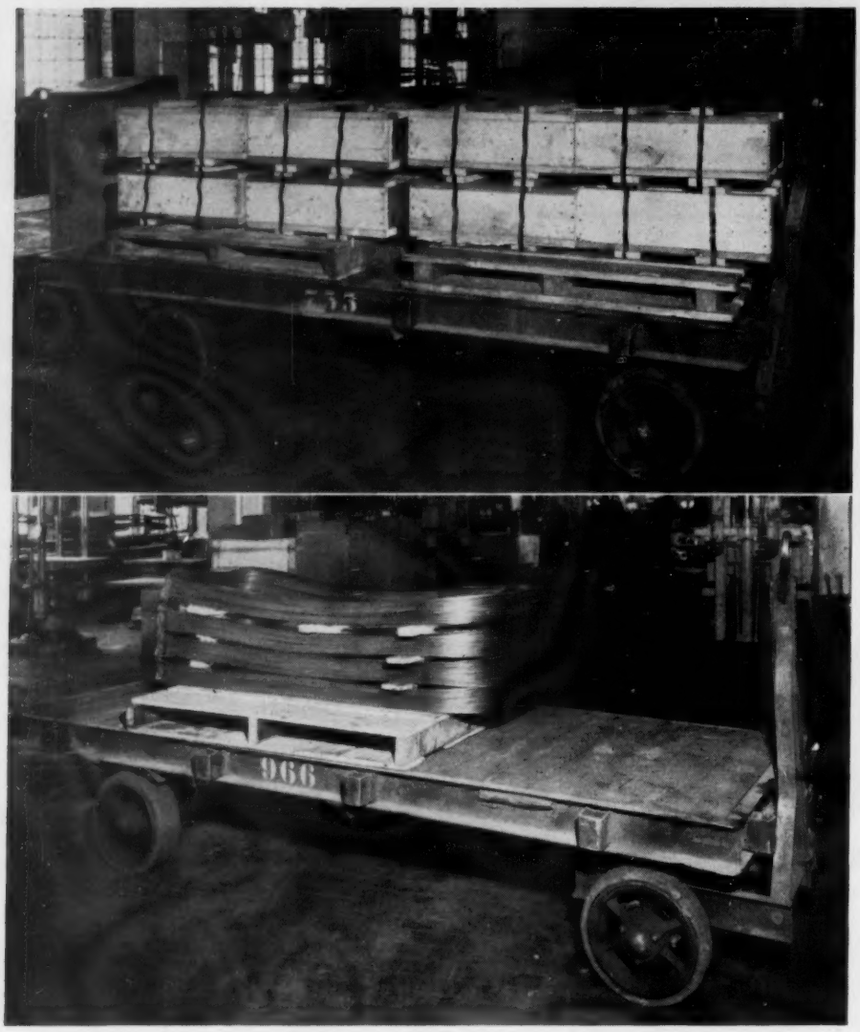

Fig. 3. (Upper)—Fork truck loads and unloads metal-bound boxes, handling them in groups of four on double-faced pallets as shown here. Fig. 4. (Lower) —Unit load of four edgewise-wound copper coils on pallet handled by fork truck

materials handling problem, special skids were constructed. These skids were planned to be used with a fork type battery truck that would carry 15 to 20 brush holder units. As will be seen in Fig. 1, this special skid has three platforms or shelves upon which the brush holder assemblies are placed. This special skid then permits brush holder assemblies to be handled in a large group.

Present procedure is as follows. The skid is placed beside the assembly bench and loaded as the operator completes the assemblies. When full, the skid is transferred to the store room by means of the battery operated, fork type truck. It remains in the stock room until the parts are needed. Then the skid, with its load of 15 to 20 brush holder units, is carried by the fork truck to the point where the motor-generator set is being assembled. Here the whole skid is lifted by crane to the platform of the motor-generator set.

Much greater ease in handling and a reduction in cost has resulted by adoption of this method of handling these units. Too often this materials handling problem would have been passed over, the amount of work appearing too small. However, the savings in this case were substantial.

Another instance of increased efficiency in handling which also resulted in a substantial saving was in the handling of rotor bolts. These rim bolts are used to fasten the rotor and weigh approximately 50 pounds each. Previously these bolts, made in the screw machine department, were transferred by trailers to the stockroom. They were handled, one by one, onto the trailer and then stacked, one by one, from the trailer onto the floor in the stockroom. When needed, the bolts were again loaded, one by one, onto a trailer or skid and transferred to the job. Here they were again removed, one by one, making six

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A.S.T.M. Changes Plan of Publishing Specifications

■ Important modifications are to be made by the American Society for Testing Materials in the methods of publishing its standard specifications and tests. These changes will become effective in November. The major change is to combine the *Book of Standards*, issued triennially, and the *Book of Tentative Standards*, issued annually. These changes, which also embody numerous advantages, are necessary because of the great growth of the standardization work.

All of the 870 A.S.T.M. standards are in widespread use in many branches of industry and commerce. Each is available and will continue to be available in separate pamphlet form, and also have been issued in triennially published books of standards with an annual volume giving the so-called tentative standards and tests.

The new method of publication will be to issue the standards and tentative standards collectively in one triennial publication, divided into three parts: Part I, Metals; Part II, Nonmetallic Materials—Constructional; and Part III, Nonmetallic Materials—General. Publication of new and revised tentative standards in the annual *Proceedings*, Part I, will be discontinued; the *Proceedings* including both committee reports and papers will be bound in one volume. Publication of the annual *Book of Tentative Standards* will be discontinued entirely.

In the two years between triennial publication of the new book, supplements to each of the three parts will be issued, containing revisions and new or revised standards and tentative standards for that year. Since these books will be appreciably larger than the present supplements and will have permanent reference value, they will be bound in cloth. The volume on "Methods of Chemical Analysis of Metals" published in 1936 will be continued as a separate publication.

Further details of the publication plan and prices of the various volumes can be obtained from headquarters of the society, 260 South Broad street, Philadelphia.

Versatile Finish

■ A finish that can be brushed, sprayed, dipped, air-dried or baked and applied to wood or metal surfaces subject to exterior or interior exposure is Kem Lustral, developed by Sherwin-Williams Co., Cleveland. This mirror-like finish is built around a new synthetic resin.

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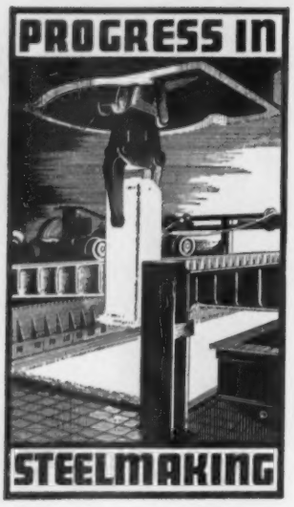

Electrotinning Strip Steel

New continuous electrotinning line fuses deposited tin coating to steel strip in an oil bath, giving excellent uniformity. Speeds up to 400 feet per minute with an output of 96 tons per 8-hour turn are obtained. Tin loss is practically eliminated

By JOHN S. NACHTMAN
Manager
Electrochemical Processes Division
Blaw-Knox Co.
Pittsburgh

■ WHEN the 4-high strip mill established itself and when continuous methods began invading many phases of steel production, continuous electrotinning and plating of strip products became inevitable, particularly since basic principles of electroplating have been understood and the process applied commercially to a limited extent for three-quarters of a century.

It may be considered that the continuous electrotinning process has been a long time in "arriving"—but that is because there has been much of a new nature to develop. From 1927 when the writer supervised the installation of possibly the first continuous unit for electrogalvanizing wide steel, there has been steady research and development to attain the most efficient and economical electrotinning process. The early electrogalvanizing unit was directly followed by similar units for plating of strip with copper, tin, cadmium and nickel. All of these early installations had some initial success, which was encouraging, but there were fundamental problems which necessitated research in many directions.

Difficulties Encountered

Among the difficulties common to the continuous electroplating of all the coating materials mentioned were those involving: the application of current to the moving strip; cleaning of the strip surface prior to plating; special means of propelling the strip and guiding it through the various tanks; even distribution of the metal coating; and accurate coordination of the moving strip with the plating current. Even at that early date, these problems were solved in a manner which, although not entirely satisfactory, made the early installations commercially successful, except for the tinning process.

The early electro-tinplate had the following limitations: the coating was too porous to afford sufficient protection for the base metal. The coating was too soft to enable satisfactory drawing or forming, with the result that tin accumulated on the dies or rolls. The tinplate lacked lustre and had a dull matte finish.

Continuous electrotinning of strip steel was proven in principle, however. Subsequent effort was devoted to solving these and other problems common to all continuous strip electroplating processes. It was also the objective to develop a better and more economical tin electrolyte and to perfect a number of electrotinning processes designed to meet varying conditions and requirements.

TABLE I

Pounds of Tin Coating Per Base Box	Hours Under Test
.48	19.2
.84	63.1
.95	84.2
1.17*	100.0 Plus*

*The test on the 1.17-pound tinplate was discontinued at the end of 100 hours when only 2.6 cubic centimeters of hydrogen were evolved as against the test standard of 5 cubic centimeters.

Results of this 12-year program are summarized here. It is believed that continuous electrotinning of wide steel strip, or plating with ferrous or nonferrous metals or alloys, is now commercially feasible on a large scale, economical basis; and that it will now produce tinplate and other plated products which meet the most exacting requirements of consuming industries.

One of the early efforts to improve the lustre and increase the hardness of the coating consisted of brushing the surface of the tinplate with rotary type machines. The mechanical difficulties of controlling this operation were tremendous. The brushes must be trimmed accurately and a precisely uniform brushing action must be applied to the surface of the strip; otherwise, the tin is entirely removed from some areas while other locations are not sufficiently brushed to give good lustre. The difficulties are better appreciated when it is remembered that the coating of electrotinplate may be only 0.00005-inch thick. Other difficulties involved increased porosity of the coating, substantial loss of tin, and lack of sufficient hardness in the coating to permit satisfactory drawing or forming of the finished tinplate.

Hot Oil Bath Fuses Tin

Subsequently, attention was directed to heat treating electrotinning strip to melt the tin and fuse it to the base metal. This was done in several ways, including the passage of the strip after tinning through a hot oil bath at a temperature sufficient to fuse the tin, followed by quick quenching of the fused coating in a cold oil bath; passing the electrotinplate through a furnace having a nonoxidizing atmosphere for the same purpose; and rolling the strip between heated rolls under nonoxidizing conditions. Of these, the oil bath proved to be the most satisfactory and gave a product with little porosity.

Such a fusing operation improves drawing and forming qualities, and reduces porosity. The latter result is a factor in increasing resistance

to corrosion. Fused electrotinplate is again discussed in the closing phase of this article.

With the objective of attaining a still more perfect product—that is, with practically no porosity—research was extended into newer channels. The duplex process was conceived with the idea of electroplating steel strip with nonferrous or ferrous metal before annealing, then plating with tin, and finally fusing the tin in an oil bath.

Use of an undercoating followed by plating and fusing of the tin, with the exception of tin as the undercoating, proved to be entirely satisfactory. The products were practically free from porosity and had a brilliant mirror-like finish. This process was installed on a commercial basis with units for the plating over undercoatings of copper, iron and bronze.

Although a satisfactory product was obtained with respect to porosity and appearance from all three of these undercoating lines, there was objection to the use of copper as the undercoating when such tinplate was to be used for cans containing food products. Use of electrolytic iron, however, appeared entirely satisfactory. Subsequent research revealed that an alloy of iron and nickel was exceptionally satisfactory as an undercoating material.

Tin Undercoat Unsatisfactory

As implied, the results were not satisfactory when tin itself was used as an undercoating material. This was because the tin undercoating, when subjected to the annealing treatment, combined with the base metal to form an excess of extremely hard tin-iron alloy which made the final product unsatisfactory for drawing or forming operations. When the amount of tin used as an undercoating was reduced to form less tin-iron alloy, it was found that preparation for subsequent plating was made more difficult. Thus it was concluded that tin should not be used as an undercoating material in electroplated products made by the duplex process.

The tin electrolyte that was developed for the electrotinplate process has many advantages over the earlier type of baths. It forms no sludge upon continuous operation as a result of oxidation of the stannous tin salts to stannic forms.

It may be operated efficiently at cathodic current densities up to 300 amperes per square foot. There is no polarization or passivity of the anodes during operation.

The bath will operate at practically 100 per cent anodic and cathodic efficiency even at high current densities.

Attempts have been made, here and abroad, to use an alkaline tin bath, but the recommended practice is to use an acid bath because no heating is required for the bath; a lower voltage may be used; and, most important, the speed of deposition of the tin is more than double the alkaline performance for the same cathode current density.

Both soluble and insoluble anodes have been used, but with the proper electrolyte the soluble anode gives a much higher recovery of tin and therefore is the logical commercial practice.

Oil Must Have Stability

During research on oil as a fusing medium for the electrotinplate, it was found that the oil must have stability at fairly high temperatures. Consequently, a special oil base was developed that would be stable in continuous operation at a temperature of 550 degrees Fahr.

This oil has other advantages as it eliminates a fire hazard. Also the tinplate may be stored with traces of the oil on its surface without being discolored.

Despite important improvements made in steel making and rolling, the production of strip inevitably is associated with the inclusion of foreign materials such as oxides into the surface of the sheet. These impurities accentuate the development of porosity, roughness and general lack of uniformity in the finished tinplate. After considerable research, it was found that this obstacle can practically be overcome and a uniform coating of tin applied by electrolytic methods if the sheets are given a restricted and controlled corrosion over the surface of the strip prior to final cleaning. This process is known as "oxide electrocleaning", and its effect is to break up the skin surface of the steel and remove surface impurities.

More specifically, the strip is passed through a special cleaning bath, which gives it an initial cleaning and puts a blue oxide coating on the strip. This oxide coating is removed by passing the strip through a pickling bath, followed by rotating scrubbers and a water rinse. This leaves the surface chemically clean, which is vitally important in the production of good electrotinplate, and the strip then is ready to pass into the plating tank.

Various tests have been set up to determine the quality of tinplate, the best known of these being the hydrogen evolution method which may be regarded as an effort to evaluate the finished product in relation to actual service conditions. Other tests include those for porosity, namely the Ferracco and hot water tests. By the application of these tests, products of various electrotinning processes may be classified in order of quality as follows:

1. Fused electro-tinplate having an electrolytic undercoat of iron-nickel alloy.
2. Fused electrotinplate having an electrolytic iron undercoat.

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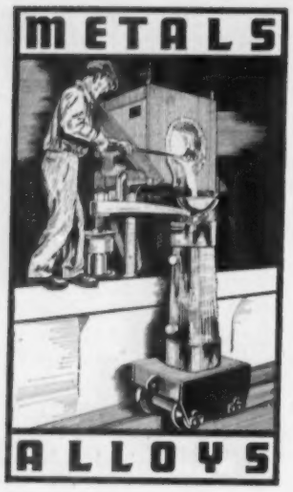
Repairs Broken Necks by Fusion Process

■ **Broken necks of mill rolls, refiner rolls, mixing, crusher and tin mill rolls are repaired by means of a foundry burning technique, devised by Fulton Foundry & Machine Co., Cleveland. From 2 to 5 tons of Meehanite metal are used for each roll, and fusion is carried out at a temperature slightly higher than melting temperature of the parent metal in the rolls no dividing line is visible after grinding. Shown above is a repaired back refiner roll used in a rubber reclaiming plant. Broken roll neck is seen in the foreground**



Silver Added to 18-8

Small quantities of this element in chromium-nickel stainless steels are found to be highly effective in overcoming sea water pitting. Less work hardening, improved machinability, higher thermal conductivity and better polishing characteristics are other benefits derived

■ AS a culmination to extensive research on sea water pitting of chromium-nickel stainless steels, discovery has been made that addition of small quantities of silver to the steel imparts a high degree of resistance to this type of corrosion and at the same time benefits certain other important characteristics, such as reducing the work hardening effect, improving machinability and increasing heat conductivity.

A patent on the new steel was issued by the United States patent office, May 2, to the Chemical Foundation Inc., 654 Madison avenue, New York, which for some time has sponsored experimental work at Massachusetts Institute of Technology, Cambridge, Mass. The patent, No. 2,156,914, was issued to Albert L. Kaye, Robert S. Williams and John Wulff, research workers associated with the institute, and was assigned to the Foundation. Application had been made July 17, 1936. It is the first of a group of patents to be issued as a result of research conducted at the institute and is available for license to American industry.

Field of Application

The invention is claimed to be particularly applicable to stainless steels of the 18-8 type, since it contains about 18 per cent chromium, 8 per cent nickel, the carbon being less than 0.35 per cent; and to equivalent stainless steels in which the nickel is replaced, wholly or in part, by manganese. Such steel strongly resists general surface corrosion and therefore is valuable when exposed to air and water under ordinary atmospheric conditions.

When exposed to sea water, however, stainless steel frequently develops hidden subsurface pits or pockets which may be entirely invisible on the surface or are revealed only by microscopic specks, the remainder of the surface retaining its luster, although the interior may be honeycombed with destructive pits. Formation of such pits, it is explained, takes place rapidly and sometimes with little or no outward signs, so that it creates a dangerous situation.

This type of corrosion is referred to as pit corrosion or pitting to distinguish it from general corrosion, which takes place over large surface areas which are in planes parallel to the original surface, and from intergranular corrosion, which takes place in the immediate vicinity of the grain boundaries of the metal.

Molybdenum Also Useful

Addition of silver, it is stated, is believed to be useful primarily, if not entirely, with chrome-nickel and chrome-manganese steels which do not in general contain amounts of other metals sufficient to change the general characteristics of the steel or to counteract the beneficial effects of the silver. Likewise, the invention is said to be primarily useful with alloys in which its percentages of chromium and nickel or the equivalent approximate 18 and 8, respectively. Silver is the only metal discovered to have the valuable properties when combined, although a combination of molybdenum and silver affords some unexpectedly favorable consequences.

Presented in the patent are six formulas of analysis which have been found to be particularly effective for certain specific properties; three for resistance to pit corrosion, and one each for free machining properties, high surface polish, and high thermal conductivity. It is pointed out, however, that each analysis has all of the properties indicated to some degree; also that the remainder of the alloy is essentially iron, with small amounts of phosphorus, sulphur, silicon, etc., which are more or less usual in stainless steels of this general type.

The formulas are as follows:

For Resistance to Pit Corrosion

Formula 1

	Per cent
Carbon, less than	0.07
Nickel	8.00
Chromium	18.00
Silver	0.30
Molybdenum	4.00

Formula 2

Carbon, less than	0.07
Nickel	8.00
Chromium	18.00
Silver	0.25
Molybdenum	3.00

Formula 3

Carbon	0.06
Nickel	11.50
Chromium	18.27
Silver	0.42

For Free Machining Properties

Formula 4

Carbon, less than	0.16
Nickel	8.00
Chromium	18.00
Silver	0.15

For High Surface Polish

Formula 5

Carbon, less than	0.16
Nickel	8.00
Chromium	18.00
Silver	0.50

For High Thermal Conductivity

Formula 6

Carbon	0.07
Manganese	0.12
Nickel	9.42
Chromium	19.32
Silver	0.14

Comparative total immersion tests in acidified ferric chloride solution (a severe pitting medium for stainless steel of this general type) have shown that in a stainless steel having a composition corresponding to Formula 3, the pit corrosion produced by equal periods of immersion is only about 16 per

ADVERTISING PAGES REMOVED

cent of that of a standard 18-8 steel without silver.

It has been observed that pitting occurs in stainless steel exposed to the action of sea water if a portion of the surface is protected from constant exposure to sea water. For instance, a ring of pits will occur around the edge of a barnacle while the remaining surface of its plate will be unpitted. Likewise, if a rubber band is placed around a stainless steel pipe and the pipe immersed in sea water, pits will be formed in a ring around the pipe adjacent the edge of the band. It is reasonable to suppose that the oxygen in the air or sea water is partly excluded from the covered surface while it is freely admitted to the exposed surface and that the resulting difference in oxygen concentration produces a difference of potential which accelerates the chemical reaction and the formation of chlorides.

Action Is Electrolytic

The chlorides of iron and of chromium are readily soluble in sea water, consequently, as it is formed, the chloride goes into solution and is carried away, leaving the spot exposed for further formation of chloride and a continuation of the electrolytic action. As the pit forms, the difference in oxygen concentration between the inside of the pit and the body of the surrounding metal is intensified and the electrolytic action is stimulated.

When even minute amounts of silver are included in the alloy, it is pointed out, the action is quite different because the chloride of silver is insoluble or only slightly soluble in sea water and is not dissolved and carried away by the sea water but remains and covers the spot, forming an insoluble protective coating over it. In this respect, it behaves somewhat as does an article made of copper, which, when exposed to the air, soon forms a closely adherent protective layer of copper oxide which effectively prevents further oxidation of the metal.

Accordingly, addition to stainless steel of small quantities of a metal, of which silver is the chief example, which forms an insoluble chloride and consequently a self-heating protective film, results in almost complete protection to the body of the steel. Molybdenum has this property to some extent, but while lead and thalium also form insoluble chlorides their alloying properties do not render them useful for increasing corrosion resistance of stainless steel.

Silver is completely insoluble in iron and although stated to be soluble up to 10 per cent in chromium at melting temperatures, it comes out of solution upon solidification, and no effective amount remains in solution. On the other hand, silver makes a solid solution with nickel up to about 4 per cent and with manganese up to about 20 per cent, while nickel and manganese are themselves soluble in iron and chromium in all proportions. Therefore, although silver may be added to an iron-chromium alloy, none will be present in the grain upon cooling, but the added silver will be found to be segregated at the grain boundaries. This is also true of an iron-chromium-copper alloy.

On the other hand, when nickel is present as in 18-8 stainless steel, the silver, being soluble in the nickel-chromium-iron alloy, is in solution throughout the entire grain structure and is not merely segregated at the grain boundaries. Accordingly to obtain the beneficial effects with addition of silver, it seems to be necessary that nickel or manganese shall be present as well to accomplish solution of the silver, and reduce the amount of segregation of silver at the grain boundaries.

These facts are believed to afford an explanation of the singular resistance of chrome-nickel-silver stainless steel to pitting when exposed to sea water. Since the entire surface of the metal—the grain as well as the grain boundary—contain silver, the water insoluble self-healing film of silver chloride forms over the entire surface of the metal, protecting it, instead of leaving the grains themselves exposed to the electrolytic effect of the sea water if there is a difference of potential due to a difference in oxygen concentration. This continuous self-healing film of chloride covering the entire surface of the metal forms an effective protecting layer which prevents further attack at any point within the area covered by the coating.

Better Thermal Conductivity

In addition to the foregoing primary advantage of employment of silver in combination with other elements of chrome-nickel stainless steel, other advantages of great importance result. The new alloy is found to have thermal conductivity which is considerably greater than that of ordinary 18-8 stainless. For instance, tests gave a heat conductivity of stainless steel of a composition corresponding to Formula 6 of 0.053 c. g. s. units per second, whereas tests made with the same apparatus and under the same conditions, of a standard 18-8 steel without silver but otherwise of nearly the same analysis, gave only 0.042 c.g.s. units per second.

It is apparent that stainless alloys containing more than 0.14 per cent silver would show even a greater increase in thermal conductivity. This increase of 26 per cent or more in the heat conductivity of the improved alloy is regarded as a great advantage, since 18-8 stainless steel as now made is unsatisfactory for use in many places where high heat conductivity is desirable.

It is found also that the new alloy is much less subject to work hardening than ordinary 18-8 stainless steel, which hardens so much as to render machine operations such as filing and sawing extremely difficult. Experience shows, for instance, that a piece of ordinary 18-8 work hardens so much after one or two strokes of a jewelers hacksaw that the saw will not cut it effectively afterwards, while a similar piece of silver alloyed metal may be cut completely through with a single blade. This property, it is claimed, greatly increases the range of usefulness of stainless steel in the arts.

Machining Made Easier

When turned in a lathe, ordinary 18-8 forms a springy continuous chip which is likely to wind itself around the tool or the work and interfere with the machining operation. The alloy containing silver is said to turn in about the same manner as ordinary cold rolled steel.

According to the claim made, stainless steel containing silver can be given a better surface polish than comparable steels and this can be done with much less difficulty. This property enhances the corrosive resistance of the metal, as polishing tends to render the surface of the material more uniform and therefore less susceptible to electrolytic action.

It is regarded as possible that the silver-bearing alloy may have a toxic effect and therefore tend to kill or discourage the growth of water organisms which might otherwise adhere to the surface of the metal and cause areas of different oxygen concentration.

While exact proportions of the several ingredients in a stainless steel incorporating the addition of silver are susceptible of considerable variation, so long as the characteristics of the alloy as a typical stainless steel are not materially changed, it is believed that the most useful and practical proportion ranges of the several elements are substantially as follows: Carbon, not more than 1 per cent; chromium, 6 to 20 per cent; nickel and/or manganese, 20 to 0.50 per cent; and silver in effective amounts up to 1 per cent in case of nickel and up to 2 per cent in case of manganese, and to which molybdenum may be added up to 4 per cent.

Midget Engines

(*Concluded from Page 49*)

receptacle top carries a threaded cap which is removed to permit filling with gasoline. Capacity of fuel reservoir is less than 1 ounce, but sufficient to operate the engine for about 8 minutes. Contest flights of model airplanes usually take only about 30 seconds. Thus ample fuel supply is available with no undue weight. In these small planes every gram of weight is an important factor just as in larger planes.

Piston and connecting rod assembly are permanent mold, aluminum alloy castings. Piston is of conventional design with step-type head, two 1/32-inch slots for piston rings, and bosses to support a bronze wristpin. Wall thickness of the piston is slightly over 1/64-inch, and two ⅛-inch holes are drilled just below the wristpin holes to permit passage of intake gases into the crankcase.

Of the 2-cycle type, engine draws intake gas into crankcase on the upstroke of the piston, compresses it on down stroke. Unfired gas is bypassed into firing chamber as soon as the piston travels past upper ports on bypass side. On the next upstroke, this gas is compressed and fired when the piston is at top center. On down stroke, burned gases are exhausted as soon as piston moves past the two exhaust ports. This cycle is repeated, with impulses on each stroke.

Lubricant In Gasolene

Connecting rod measures 1 9/32 inches from hole to hole. Cross section is about ⅛ x 7/64-inch. It will withstand a maximum straight pull of 632 pounds. Hole tolerances are kept within the limits of 0.1255 and 0.1260-inch. A bronze wristpin, 0.001-inch oversize, is press fitted into rod and piston, the latter being heated to insure a good fit. There is no bearing on the lower end of the rod except the softer aluminum alloy on the steel pin. Mixing one part oil with four parts gasoline in the fuel lubricates cylinder walls and bearings.

Piston rings are made specially by a leading piston ring manufacturer. Of cast iron, 1/32-inch in section, they are produced round, then split, placed over a mandrel and heat treated for spring tension, making it necessary to squeeze them together to fit the cylinder barrel.

Commutator housing is stamped from 17ST rolled aluminum alloy and is formed with a collar which fits over boss on front half of crankcase. A fiber post carrying one breaker point is held by a bolt through the upper part of the commutator; other contact is attached to a piece of steel, ¼-inch wide, 1/32-inch thick and about 1¼ inches long, bent at right angles and attached to a short piece of spring steel in such fashion that contacts are held closed except when protruding end of the aforementioned right-angle piece is lifted by the revolving cam on the shaft directly below it. Advancing or retarding the spark is accomplished by radial movement of entire commutator housing.

Stamping Used

Cam is a steel stamping, 9/16-inch in diameter except for about 135 degrees of the circumference which is relieved to permit making the spark through the contact points. Cam is ⅛-inch thick and has a square hole so it can be mounted securely on the square portion of the crankshaft. In operation, cam closes breaker points once every revolution of the shaft since the engine fires with every stroke of the piston.

Spark plug is a most ingenious small-size reproduction. Complete in every detail, even to a copper gasket, it is known as the V-2 model made by Champion Spark Plug Co., has ¼-inch thread, is ⅞-inch overall in length, with ⅜-inch nut. Points have a gap of 0.010-inch.

These diminutive engines are shipped fully assembled and bench tested. They may be mounted either upright or inverted; in the latter case, gas tank and carburetor assembly are rotated half a turn to keep them upright. The special ignition coil weighs only 1¾ ounces. The 3-volt dry batteries are the type used in pencil flashlights.

Syncro Devices has been supplying two other types of engines of this design, both somewhat larger than the Bee model described. These two have been in production for some time, approximately 10,000 being built last year. They are rated at 1/5-horsepower have ⅞-inch bore and 15/16-inch stroke.

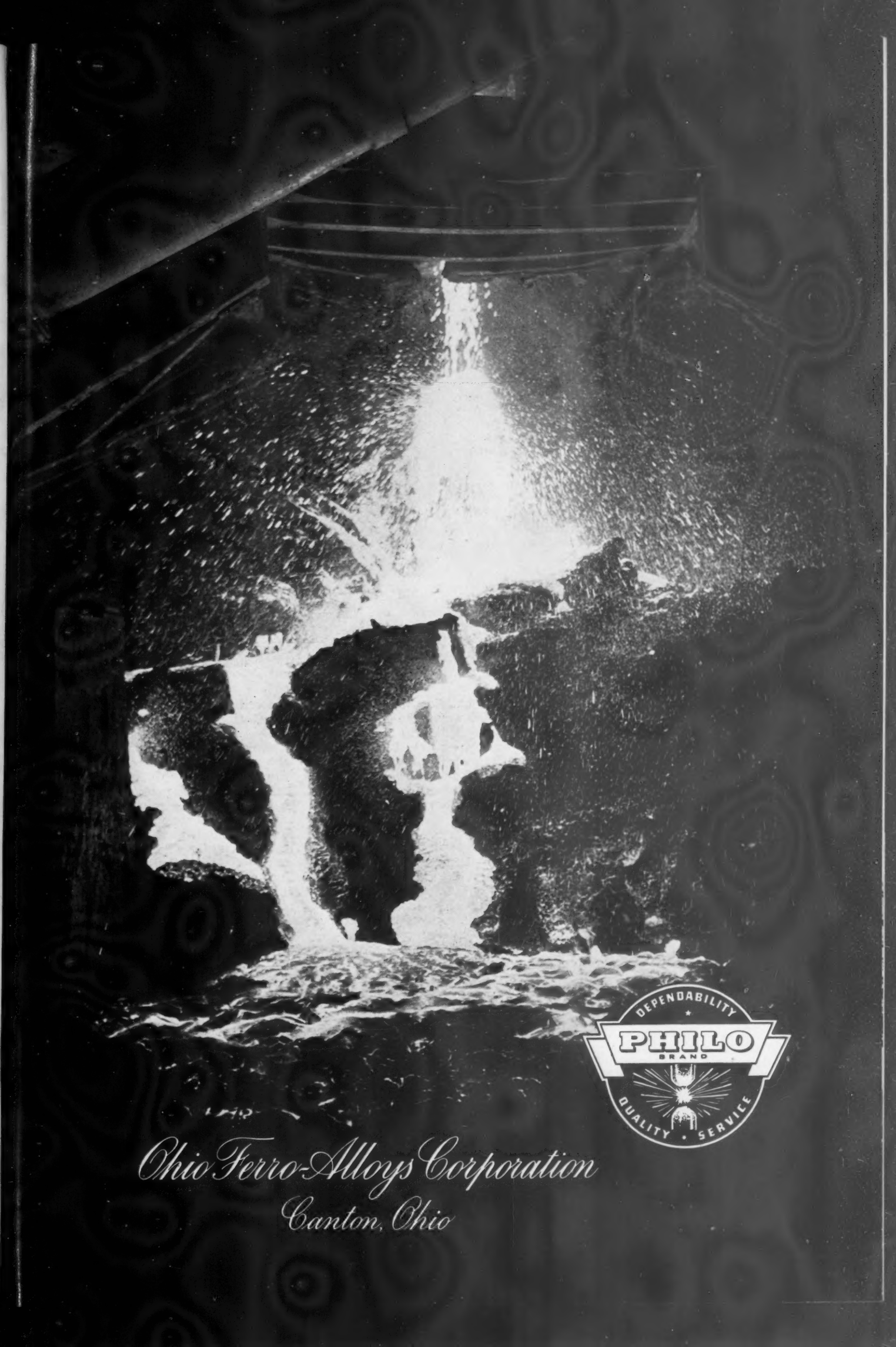
♦

Tolerances in Millionths Of An Inch

■ **Gage blocks, of which some 700 sets are used annually in the United States, now are available with chromium plating up to .001-inch thick, thus increasing their life. Elmer Ellstrom, gage block pioneer, (left) inspecting ground and lapped chromium-plated gage blocks with a tolerance of plus or minus 2-millionths of an inch. Other standard tolerances are 4 and 8-millionths of an inch. Photo courtesy Dearborn Gage Co., Detroit**

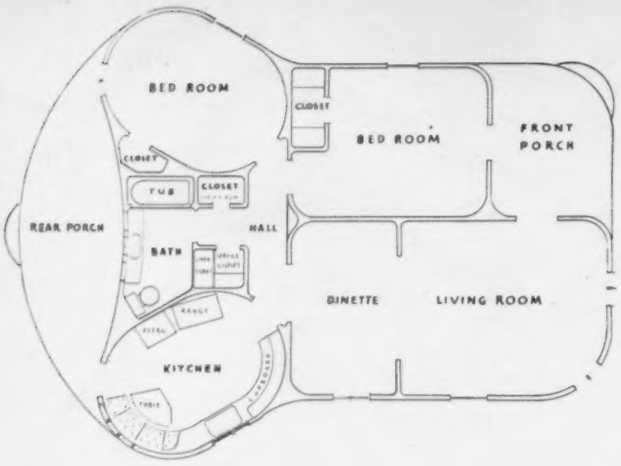
Soaked-Surface Enamel

■ Damp-Tex is a finishing enamel which may be applied over moist or water-soaked surfaces. The manufacturer, Steelcote Mfg. Co., St. Louis, states the enamel is nonyellowing, dries dust-free in one hour and is nonsagging. One coat is sufficient and one gallon covers 350 square feet on brick or cement or 450 square feet on wood or metal.



Ohio Ferro-Alloys Corporation

Canton, Ohio



Constructing Low-Cost,

This 5-room house is ultra-modern inside and out, rooms being elliptical in shape. Features are a welded steel frame, steel lath, steel doors and window frames, and steel cabinets and shelving. It is fire, sound, heat, termite and earthquake proof, and is air conditioned. At the right is a model of the house on display at the Golden Gate exposition; the floor plan is reproduced above

■ CHALLENGING present construction methods, a newly-designed welded steel frame house, now being erected in various California cities, is demonstrating the superiority of steel in modern home building.

Designed by B. J. Compton, Bakersfield, Calif., contractor, this type of house was first built in Central California, but the intensely hot days and quick cooling nights of this area proved sheet steel to be unsuitable as the principal construction material. Consequently, Compton set about to design a steel-frame house, the walls of which would offer complete insulation to heat and yet would not crack or buckle with rapid changes in temperature. The result was the present ultra-modern structure that is comfortable, economical and practically indestructible.

Not a single stick of wood, screw, bolt nor rivet is used. Floors are of suspended concrete. All structural members for the pumiceous stucco exterior walls, plaster double interior walls and concrete roof are of welded steel. Doors and window frames also are steel welded; even closet shelves are of steel, welded to steel wall studs. Streamlined inside and out, the dwelling has elliptically-shaped rooms with all corners rounded. Although unique, both in design and construction, all innovations are based on utility. The resulting structure is a building that is not only fire, sound, heat and termite-proof, but resistant to floods, earthquakes and time.

The suspended concrete floor is made with light-weight aggregates of inert materials. Rock and powdered pumice may be built into a strength of 2000 pounds with a weight of 82 pounds per cubic foot. Resting on exterior walls and internal dwarf walls, the floor, reinforced by steel bars in mat formation, has no span over 12 feet. Not even in forming these walls is wood used, for with their curved contour, steel forms tied together with angle clips have been found more economical.

Trusses Field Fabricated

Steel bowstring trusses, the cord of angle and the arc of T-rail, are fabricated in the field with an angle roll. One-inch angle is welded to the cord of the arc for the secondary member. With the proper set-up, two men—a welder and a finisher—can turn out one truss per hour. All joints are arc welded, each truss requiring 30 welds. Twenty trusses for the five-room dwelling vary in span from 18 feet 5 inches to 35 feet 3 inches. Because of the strength of the steel support, with the use of curved surfaces, the steel requirements average only 1 ton per room, as against 1½ tons without the arc. Twenty bowstring trusses; 880 feet of ¾-inch steel angle for secondary members of trusses; 350 wall studs; 38 ¼-inch round X-braces; 5/16-inch furring; 75 anchor plates, and 710 feet of bullnozing, are some of the major steel requirements. All steel is of standard sizes and may be purchased anywhere.

The roof is formed by gunited pumiceous cement over metal lath, with sound insulating material wired to the under side of the lath. The truss is designed to carry a load of 80 pounds per square foot without any partition support. Different height trusses, high in front and tapering to the rear, give the roof its streamlined appearance. For exterior trim effect, copper shingles may be nailed direct to the cement roof.

The lower cords of the roof trusses serve as ceiling joists to which metal lath is wired directly. Further to deaden all sound which might be carried into the building through the concrete roof, sound insulating material is placed on top of the lath and between the metal lath and the lower cords of the trusses. As in the wall plaster, a pumiceous mixture is used in the ceiling for its sound deadening and noncracking qualities.

Duplicate steel studs are used to support the outside finish and the inside plaster in the construction of the walls, which are entirely fireproof. The steel angle studs are welded to flat bars nailed directly to the soft pumice cement floors. Double walls of a plaster thickness

By CHARLES F. BERRY
San Francisco

Streamlined Steel Houses in California

of 1 inch for the exterior and ¾-inch for the interior with a 4-inch dead air space between are formed by approximately 300 1¼ x 1¼ x ¼-inch angle studs welded to the stud plates. Throughout the structure, a total of 250 to 300 welded tie bars are used. The welded steel studs give not only permanent durable construction but light flexible framing. By using studs with a L/K ratio of sufficient flexibility and strength, plaster cracking is eliminated.

All studs are spaced 16 inches apart, and all window frames are a multiple of 16 inches, thus making it possible to change window locations during the building without necessitating expensive structural changes. Plate glass windows are set in steel sash. To eliminate sun glare, the glass is set at an angle—out at the bottom and in at the top. In the standard design, windows are low, the bottom sill being only 18 inches from the floor. Steel window frames are welded in place and studs are tied together by pieces of 1-inch flat. Seven sliding metal doors, three curved and four straight, fitting within the walls when open, are hung on noiseless ball-bearing runways.

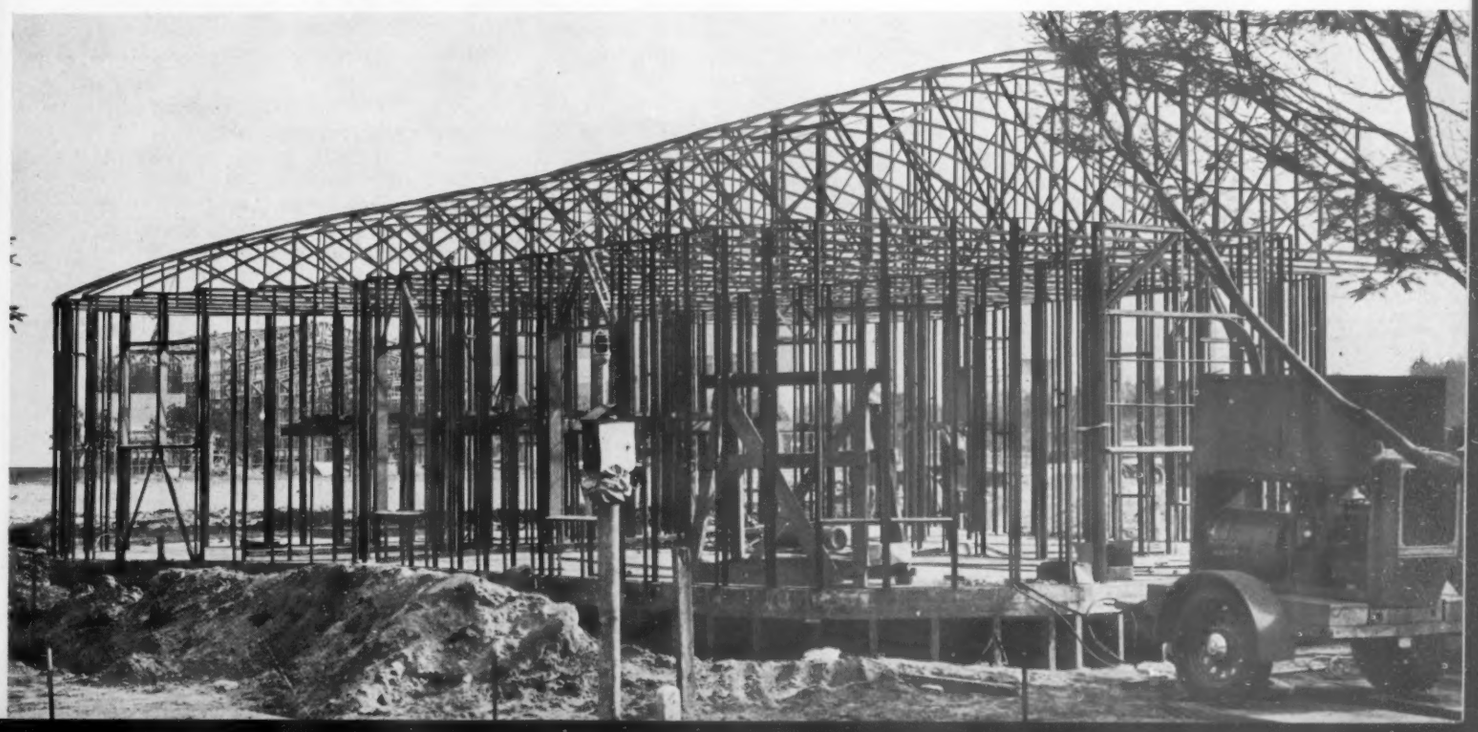
The rounded corners of rooms eliminate lost space and the traps for dirt and dust made by right angles. They also offer a practical adaptation of the house to the fundamental laws of air conditioning and heating. Air conditioning is achieved through slots beneath each window, the air being filtered through sponge-type coil radiators located in the wall and connected directly to a hot water booster heater. Surplus heat and smoky or foul air are taken care of by ceiling breathing vents leading to one common stack.

In addition to closet shelves, bathroom cabinet and kitchen cupboards also are of steel. A steel cabinet sink is used in the kitchen. An economical feature of the double-wall construction is the ease with which plumbing can be roughed in between the separated walls. All plumbing is accessible until interior walls are plastered. Copper tubing is used for the water lines and for the air conditioning system.

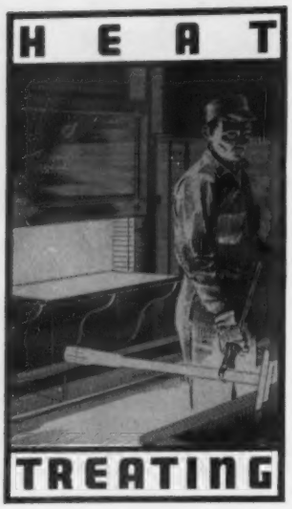
Principal labor item in the construction of this new house is steel work and welding. Welding starts as soon as the floor is set and continues without interruption until the frame work is complete. Some 5 tons of steel and 100 pounds of welding rod go into the building, which requires more than 2000 separate welds averaging 2 inches.

Cost of the standard five-room house is less than $1000 per room. Considering the permanent character of the construction, the smart design and the many modern features, including complete cold, heat and sound insulation, absolute fire protection and an air conditioning system, the price is low. Furthermore, the house combines low maintenance cost, low insurance rate and minimum obsolescence. Thus, actual expense, including upkeep over a period of years, promises to be below most houses furnishing similar interior comfort.

The degree of flexibility of design under this new type of construction depends upon the receptivity of the architect. Certainly, the architect is not greatly limited as to the front elevation. In fact, he has practically a free hand in design, but structurally he must conform to the cardinal principles—steel in place of wood; curved surfaces for strength and lightness; inert materials for aggregates; double walls; and the use of welding instead of nailing.



Shown here is the framework for the welded steel house in process of erection. Steel requirements are 1 ton per room and the material is fabricated at the site. More than 2000 welds averaging 2 inches are made. Cost of the 5-room house is less than $1000 a room



Taps and Dies

Latest developments in testing equipment, building design, heating furnaces and accessories, with a centralized automatic controlling and recording system, permits meeting exacting specifications, assures efficient operation of department, fixes responsibility and lowers maintenance costs

By N. F. MURPHY
Engineer
Foxboro Co.
Foxboro, Mass.

■ AT THE plant of Winter Bros. Co., Wrentham, Mass., the wide use of improved carbon alloy and high-speed tool steels has necessitated increased precision in manufacture of taps and dies. Use of alloys with tungsten, vanadium, cobalt, molybdenum and other elements has accentuated the importance of correct heat treating. To meet critical specifications in this plant, definite heat treating schedules with suitable furnaces and temperature-controlling instruments are employed.

To assure most efficient heat treating, full advantage has been taken of modern building design, up-to-date heating furnaces and accessories, centralized automatic temperature controlling and recording equipment and latest developments in testing and inspection apparatus.

The heat treating room is laid out for easy flow of material through the department. Arrangement of equipment is compact, yet a wide area of cleared space is available. The brick and steel building housing the heat treating department is 90 x 50 x 18 feet high at the eaves. Six ventilators run through center of the building. Natural light from 1150 square feet of glass supplemented by light modern indirect lighting fixtures assures proper illumination at all times.

Unit heaters overhead afford efficient heating when required. Water, steam, gas and oil mains are laid under the concrete floor in trenches covered by steel floor plates. An adequate system of blowers and ducts takes care of all fumes and smoke as well as constantly bringing in a sufficient volume of clean, fresh air.

Hardening, annealing and tempering furnaces with their quenching tanks and other equipment used for carbon alloy steel taps and dies are located on the east side of the room. Temperature controlling and recording pyrometers for this section are centralized on an enclosed panelboard at the northwest wall. Furnaces and quenching tanks used in high-speed steel work are arranged on the west side of the room with their controlling and recording instruments also centralized.

Thus, a broad aisle between the two rows of equipment serves to segregate the handling of carbon alloy cteel and high-speed steel. This open area faces large folding doors which permit access to the area so motor trucks can load and unload within the building. An overhead trolley hoist facilitates easy handling of heavy equipment.

City Gas Used

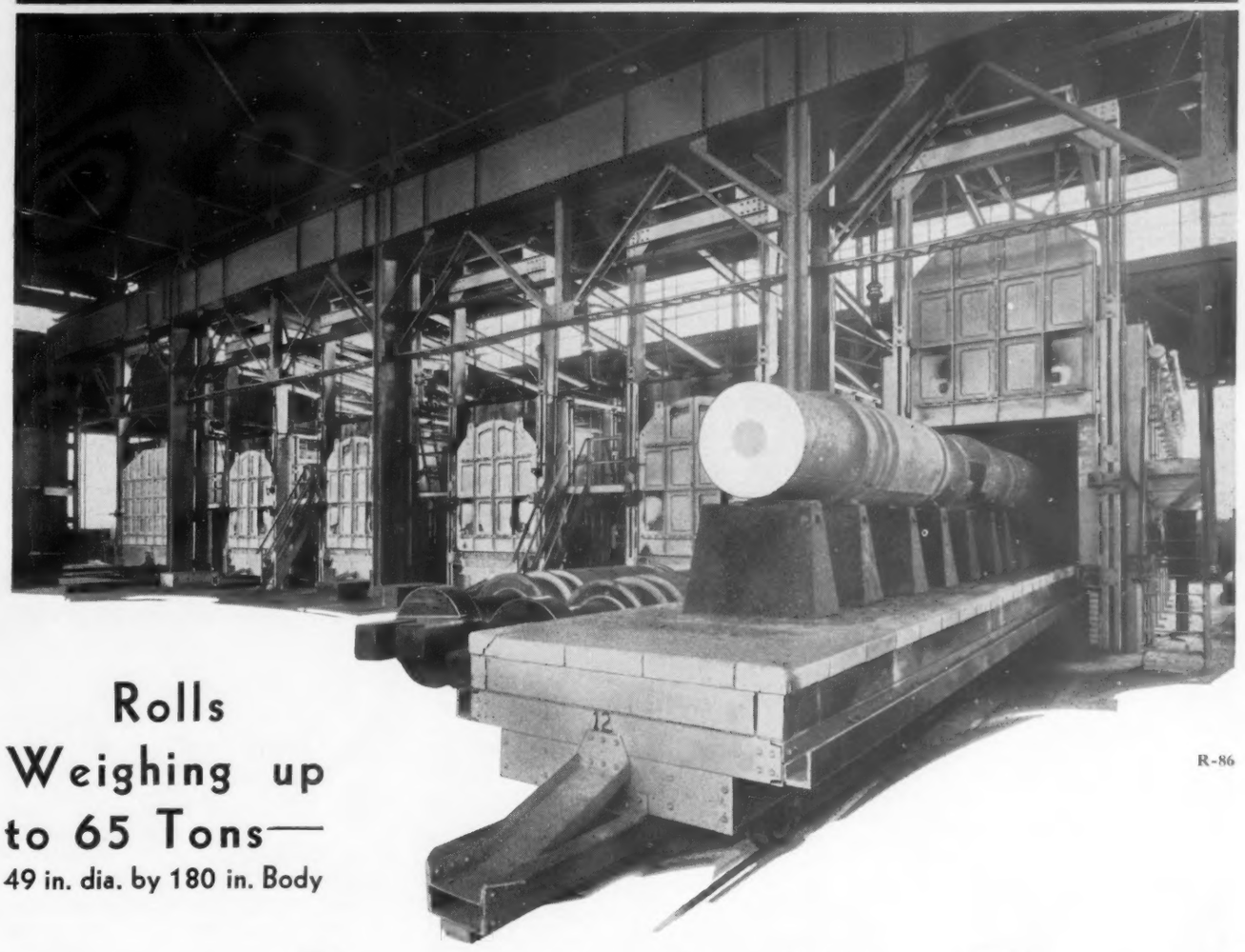
Fuel used is city gas of 540 B.t.u. content. Gas lines are equipped with safety locking-type valves which shut off supply to all furnaces in case of electric power failure or interruption. Valves must be reset manually for resumption of service. This eliminates any danger of backfire and assures safe operation of furnaces.

Equipment for heat treating ordinary carbon steel includes lead baths and salt baths of various types. The pot-type furnaces are tangentially fired, equipped with tunnel-type burners and downdraft operation. Fumes from all salt and lead baths are exhausted through ventilating systems.

Equipment for high-speed steel taps and dies includes oven-type furnaces underfired with tunnel-type burners and completely muffled.

General view of heat treating department. Note high ceiling, large window area, efficient lighting, wide aisles and efficient arrangement of equipment

UNITED USES B & W INSULATING FIREBRICK



R-86

Rolls Weighing up to 65 Tons—

49 in. dia. by 180 in. Body

Economically Heat-Treated

Six Car-Bottom Annealing Furnaces at United Engineering and Foundry Company, Vandergrift, Pa. Lined with B&W Insulating Firebrick. Designed and built by George Naismith and Son, Pittsburgh, Pa.

Significant Facts

These six modern furnaces are natural gas fired; they were built in 1936 and 1937. Furnace dimensions (inside): Three are 7 ft. wide by 38 ft. long; two are 7 ft. wide by 42 ft. long; one is 16 ft. wide by 34 ft. long; all are 7 ft. high car-top to skew line. Construction: side and end walls 13½ in. B&W Insulating Firebrick plus 1½ in. insulating block; roof and doors, 9 in. B&W Insulating Firebrick.

B&W Insulating Firebrick have helped to save fuel, reduce annealing time and speed up production. Due to their high insulating value, a very uniform temperature is maintained throughout each furnace.

Bulletin R-2-F gladly sent upon request.

THE BABCOCK & WILCOX COMPANY . . . *Refractories Div.* . . . 19 Rector St., New York, N. Y.

BABCOCK & WILCOX

These furnaces are equipped with atmosphere control.

All quenching baths employ oil which is contained in tanks with round corners and located adjacent to furnaces. Oil is circulated to tanks from a large underground storage tank outside the building. Each tank can be drained easily by simply operating a drain valve.

An individual, potentiometer, automatic, temperature controller regulates the fuel flow to each furnace burner system by means of a 2-position motor-operated valve. Single valve control of the air to each proportional mixer assures correct air-gas ratio for proper combustion. Accurate temperature measurement and positive control is essential in tap and die work. To assure maintenance of a definite temperature-time cycle schedule, potentiometer-type controllers with no "dead spot" in the controlling mechanism are used in conjunction with accurate timer clocks.

Instrument Panels Enclosed

Instruments for the carbon-steel furnaces are grouped together on a steel panel. Controllers and recorders are mounted flush, and the panels themselves are enclosed. This method of installation protects the instruments from accidental mechanical and electrical damage, facilitates checking and maintenance service, permits definite supervision of operations and presents an appearance in keeping with the general, clean-cut surroundings. Instruments for the high-speed steel furnaces are centralized nearby on a similar panel.

Controllers for use at temperatures under 2000 degrees Fahr. are calibrated for chromel-alumel thermocouples. Platinum-type thermocouples and controllers are used for the 2400-degree temperature ranges. Each controller has three mercury switch contacts which actuate the motor-operated valves and which close circuits to the signal lights.

Signal Lights on Furnace

A set of three signal lights, colored white, green and red, is installed at each furnace. These lights indicate whether furnace is operating above, below or at the temperature desired. They assist the operator in maintaining correct treatment schedule.

Separate, multiple point, potentiometer, strip-chart type recorders are connected to thermocouples in the tempering furnaces to provide a permanent temperature record of each load placed in the baths. Use of separate controlling and recording instruments on this important operation gives a continuous check on all equipment operation also.

A portable indicating pyrometer is used periodically to check thermocouples in service. Spare thermocouple assemblies permit replacement to be made without interrupting furnace operation.

To provide for future additions to present equipment, provision has been made in spacing of furnaces and instruments. Present water, steam, gas and oil supply capacities are sufficient for any increased demands.

Work heat treated consists of all types of dies and taps. These include many special designs. Heat treating standards are set up and checked by the laboratory. Foremen of heat treating department, metallurgist and his assistant are responsible for proper heat treatment during production. All work is heat treated on a temperature-time basis established by the laboratory.

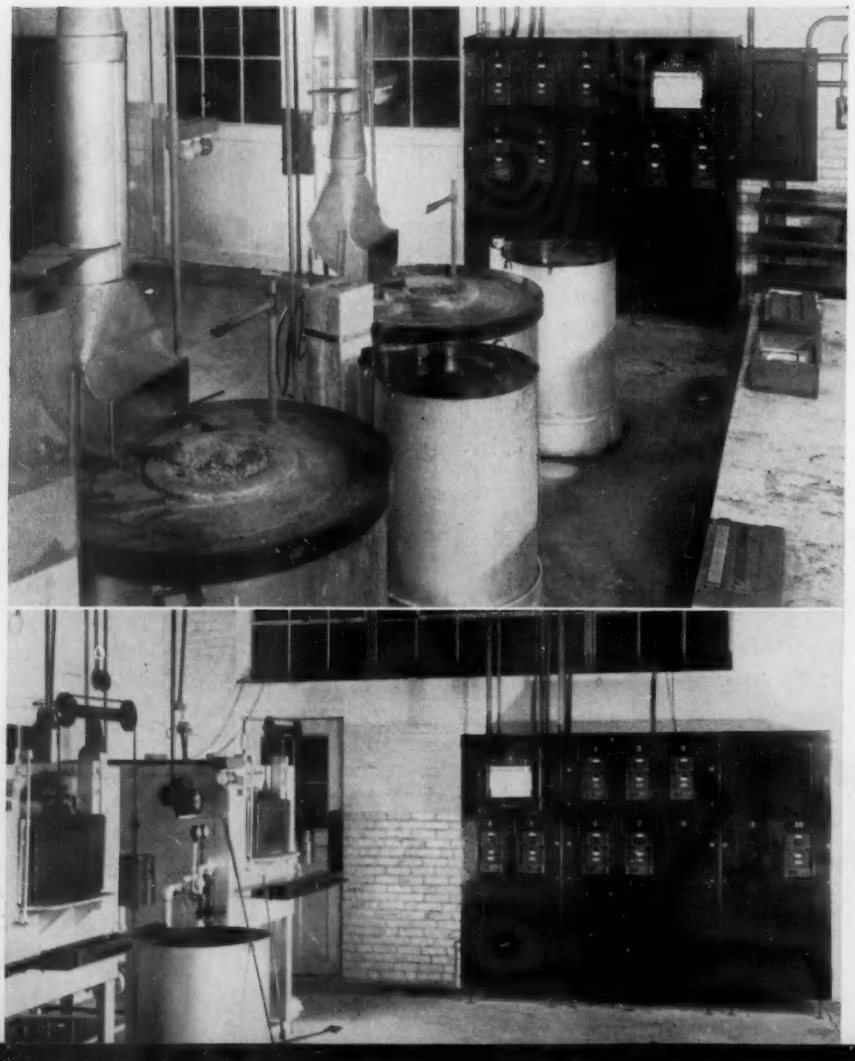
Taps and dies are handled in batches of various quantities, racked near the furnaces until operators are ready to handle them. Carbon-steel work is put into lead or salt baths and quenched after being held for a definite time at the predetermined temperature.

High-Speed Steel Preheated

High-speed steel is placed in a preheat furnace for a specified length of time and then transferred to a high-heat furnace for a limited period with temperature and atmosphere being controlled carefully. After this, it is removed and quenched in oil. Subsequent tempering of all high-speed tools is done in salt baths under close control of time and temperature.

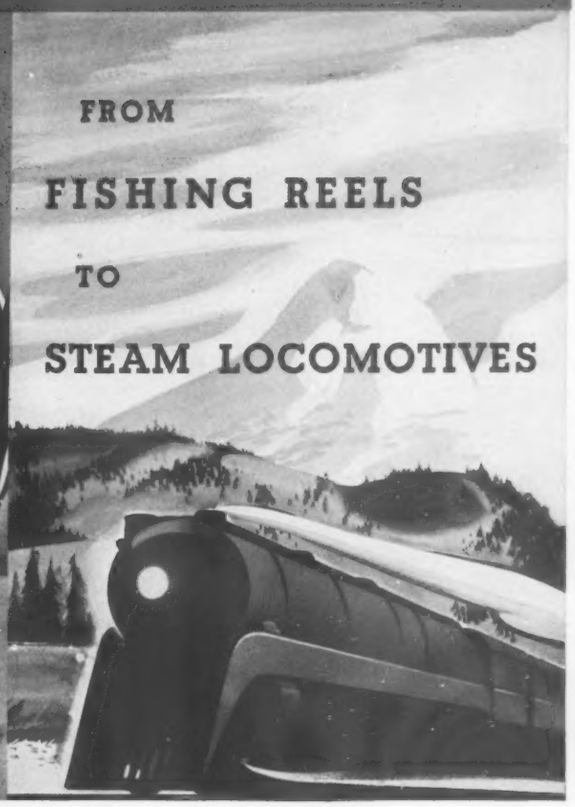
Cleaning and straightening operations are carried on in the same building. All pieces receive a general inspection while a representative lot finds its way to the inspection and research laboratory. These are checked carefully for hardness and toughness and photomicrographs are taken to record micro structures. Precise dimensional measurements are made. Physical testing under actual working conditions checks quality and working characteristics. Thus, all guesswork is eliminated, and a high degree of uniformity attained.

Since installation of this modern heat treating department, definite dividends have been obtained in the form of reduced number of rejects, lower maintenance cost and better working conditions. Also with important temperatures accurately recorded, it is possible to fix the responsibility of proper heat treatment and to assure that prescribed schedules are carefully followed.



Upper, part of row of lead and salt pots with centralized control extending down length of room. Lower, portion of high-speed furnace and control equipment which occupies opposite side of department

STAINLESS STEEL SPRING WIRE



WISSCO Stainless Steel Spring Wire has established an entirely new service standard for springs exposed to moisture, live steam, acids and alkalies. It possesses all the "life" of the best conventional ferrous spring wire, has corrosion resistance equal to all and better than most non-ferrous spring wires, yet takes longer to "set". Many periodic spring replacements that were considered trade nuisances are no longer tolerated. Consider what spring failure means to you. Add the cost of springs and installation to the loss from interrupted service. We will gladly give you the story of savings of Wissco Stainless Steel Spring Wire.

WICKWIRE SPENCER STEEL COMPANY

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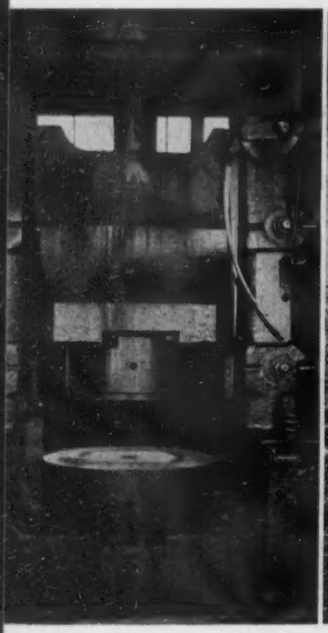
Wickwire Spencer manufactures High and Low Carbon Wires—in various tempers, grades and finishes—for your specific purpose. Hard-Drawn, soft or annealed Basic or Bessemer Wires—Hard-Drawn annealed, or oil-tempered Spring Wire, Chrome Vanadium Spring Wire—Valve Spring—Music—Clip—Pin—Hairpin—Hook and Eye—Broom—Stapling—Bookbinding—Dent Spacer Wire—Reed Wire—Clock—Pinion—Needle-Bar—Screw Stock—Armature Binding—Brush—Card—Florist—Mattress—Shaped—Rope—Welding. Flat Wire and Strip Steel, High or Low Carbon—Hard, annealed or tempered—Clock Spring Steel—Corrosion and Heat Resisting Wires. Consult the Wissco technical man on your wire problems, however large or small.

WISSCO WIRE
by Wickwire Spencer

FORGING



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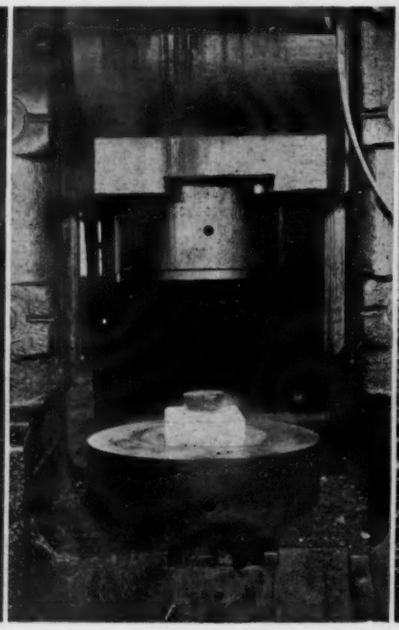

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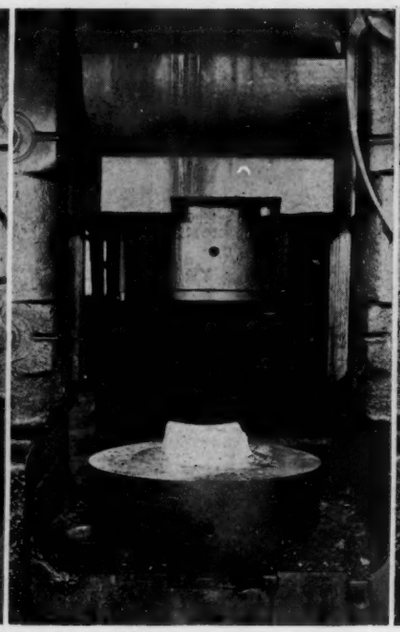

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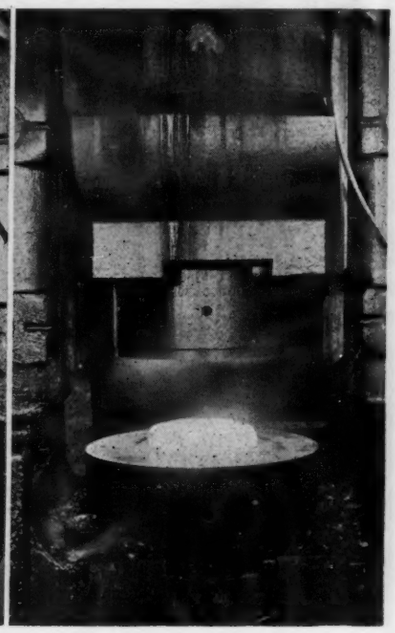

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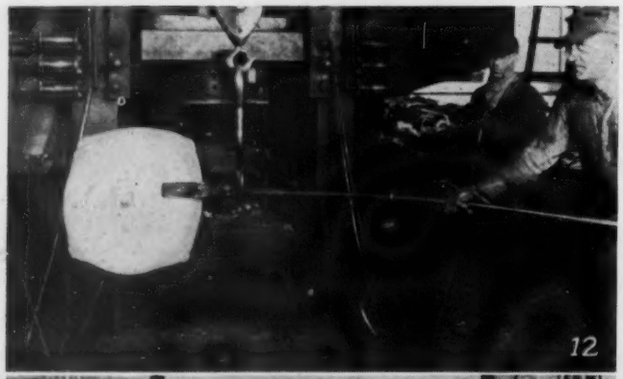
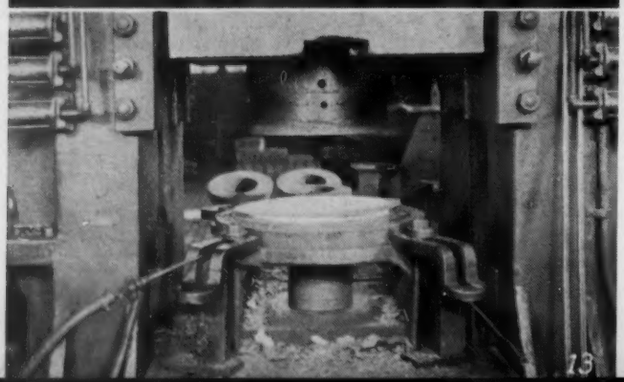
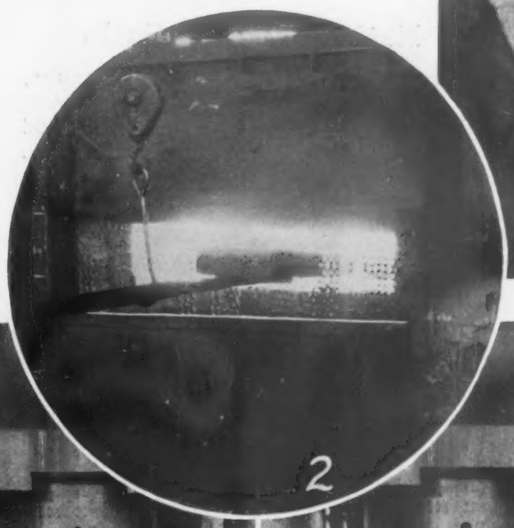
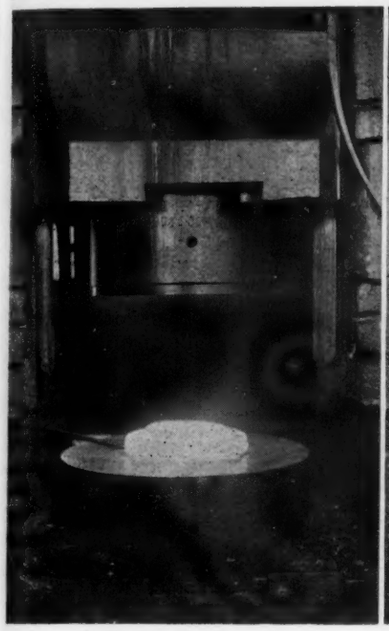




■ Steps in drop forging of pipe flanges at Chicago works of Crane Co. are as follows: Fig. 1, cutting torch is cropping 4½-inch steel billets into slabs 14 inches square. In Fig. 2, slab is being placed in gas-fired heating furnace maintained at 2800 degrees Fahr. Steam drop hammer, Fig. 3, has falling weight without dies of 22,000 pounds, dies weigh 1200 to 3500 pounds. With 100-pounds-per-inch steam, maximum impact die-to-die is 8,300,000 foot pounds. Maximum velocity is 26.6 feet per second. First 6 feet of 30-foot foundation under hammer consists of 12 x 12-inch timbers, acting as a cushion. Remainder is block of concrete, 24 feet deep. Cylinder bore is 30 inches; stroke, 52 inches. First step in forging is to place disk of cold steel on hot billet prepara-

FLANGES





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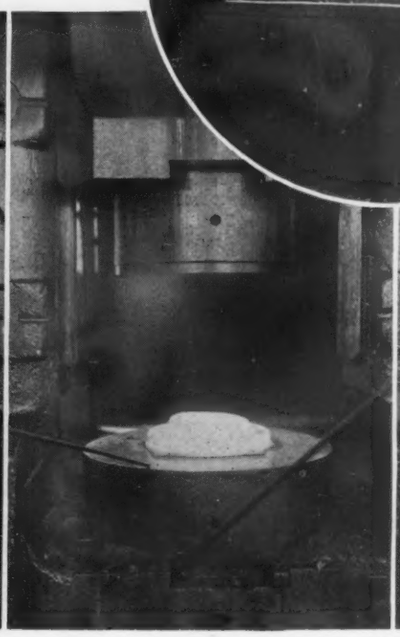

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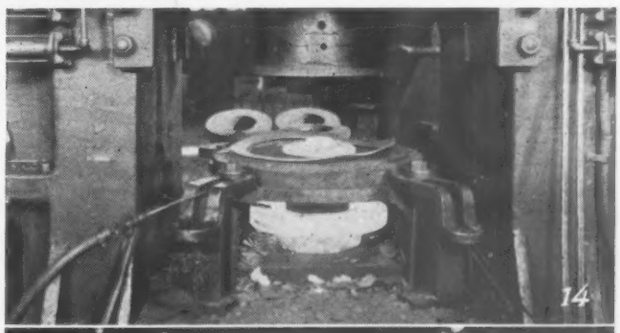
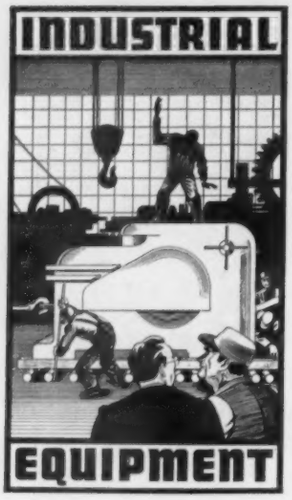
tory to forming a cut. Fig. 4. Fig. 5, three blows of hammer and disk sinks through the steel easily. Here removed disk is lying at side of anvil. Fig. 6 shows hammer in action. Besides hammer man, three helpers are needed, one blows scale from forging with air gun, second swings oil-soaked mop against upper die, third operates furnace and trimming press. Remarkable series of photos, Figs. 7, 8, 9, 10, 11, show successive stages in forging operation. In Fig. 12, flange is removed from hammer by tongs suspended from a traverser with an air hoist and moved to trimming press. Fig. 13 shows flange partly trimmed, Fig. 14 completely trimmed. Finished flanges are shown in Fig. 15. These are now ready for heat treating and machining





Vibratory Feeder

■ Syntron Co., Homer City, Pa., announces model "F-O" vibratory feeder, with no moving or wearing parts, for controlling flow of bulk solids. Rated at a capacity of 2000 pounds per hour of 100-pound ma-

terial such as sand, this model is intended for small, finely controlled feeds of down to a few pounds per hour, such as is required to feed chemical reagents, articles to inspection belts, material to automatic weighing machines, etc. Unit is made of a sheet metal trough 18 inches long by 3 inches wide, with tapered sides from rear to front, mounted on springs and actuated by a pulsating electromagnet. Finger tip control of rate of flow is accomplished by regulating vibratory action through a rheostat in controller, which also contains operating switch.

Interlocking Junction

■ Ohio Brass Co., Mansfield, O., has developed type B interlocking

junction in steel case for making direct-current trailing cable connections with power off. Quick-break switch is interlocked with case so case cannot be opened and connections cannot be made with power on. Hand grips on trailing cables have three split phosphor bronze plugs so arranged that plugs cannot be inserted in wrong circuit. Unit is mounted on moisture-proof insulating panel.

Ratio Counting Scale

■ The Exact Weight Scale Co., Columbus, O., offers visible ratio counting scale for predetermined counting and counting an unknown

quantity. A few pieces of material are placed in ratio pan and remainder on scale. Pan is balanced on beam, and indicator shows by direct reading number of pieces on scale. For predetermined counting, pan with required amount is set on beam to give required reading, and scale is loaded until pan balances.

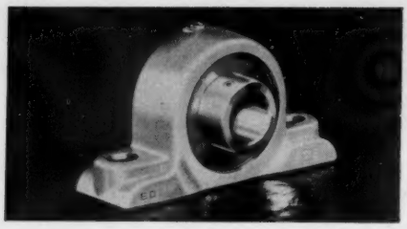
Portable Blower

■ The Breuer Electric Mfg. Co., 5100 North Ravenswood avenue, Chicago, announces that waterlift on its 1 horsepower portable electric blower has been raised from 46¼ to 52 inches, with proportionate in-

crease on three smaller models. Units are equipped with double grease seal ball bearing and double-curved extension handle for floor cleaning.

Pillow Blocks

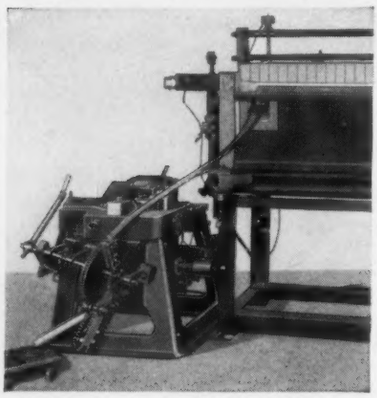
■ Ahlberg Bearing Co., 3025 West Forty-seventh street, Chicago, offer Series ED ball bearing pillow blocks with single row bearing in die-cast housing. Ball bearing is assembled to provide for shaft deflection and misalignment up to 1 degree. Seals are of floating construction, eliminating friction and increasing life of both seals and



bearing. Seals are of neoprene synthetic rubber which is not affected by oil or grease. Standard shaft sizes are ½, ⅝, ¾, 15/16, 1, 1⅛ and 1 3/16-inches.

Forges Mine Bits

■ L. M. Brown, Inc., Homestead, Pa., announces a machine that forges high-alloy steel mine bits said to cut four to eight times as many lineal feet of coal per dressing as carbon steel bits and which may be redressed 120 to 140 times. Unit comes complete with forging machine integrated with heating furnace so passage of bits from furnace is co-ordinated by chute



with action of machine. One lever controls forging action. Furnace is oil-fired by fuel-oil pump and is constructed of carborundum refractory brick, nonspalling Varnon fire brick and Armstrong insulating brick.

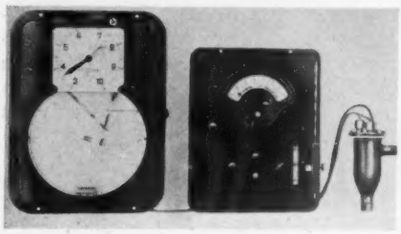
High-Speed Press

■ Charles F. Elmes Engineering Works, 230 North Morgan street,

Chicago, offers high-speed hydraulic press with extremely sensitive and accurate control features. Stroke adjustment of moving platen is guided on four adjustable gibs. Platen can be lowered a fraction of an inch at a time. Bed is arranged for cushioned cylinder. All moving parts are pressure lubricated. Illuminating lamps are inserted in openings in two side housings.

pH Record and Control

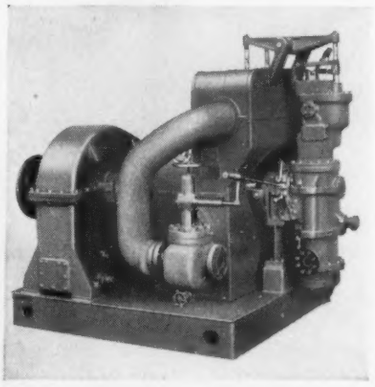
■ The Bristol Co., Waterbury, Conn., has developed recorders and controllers using glass electrode method of measurement in wide strip-chart and round-chart models. They can be plugged into any standard light circuit, fluctuations in line voltage being automatically compensated for. Shielded glass



and calomel electrodes are used. Assemblies are either enclosed flow type (solution under measurement is pumped or allowed to flow through chamber) or immersion type (designed for immersion in tanks and vats). They can be used in viscous or even semi-solid substances and in rapidly circulating or flowing liquids.

Steam Turbines

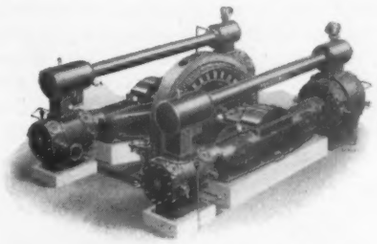
■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., offers multi-stage steam turbines ranging from 100 to 2000 horsepower, 100 to



5500 revolutions per minute for steam pressures to 650 pounds, temperatures to 750 degrees Fahr., exhaust pressures to 200 pounds, vacuum to 29 inches of mercury and extraction pressures to 200 pounds. Modifications of basic design provide for condensing, condensing extraction, noncondensing, noncondensing extraction or mixed pressure service.

Four-Corner Compressor

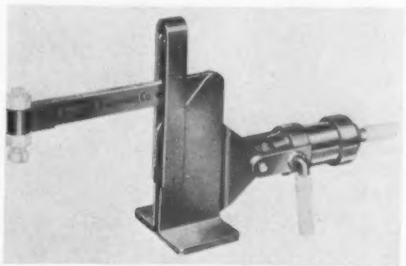
■ Ingersoll-Rand Co., Phillipsburg, N. J., has redesigned its 4-cylinder direct-connected synchronous-motor-driven compressors of 700 to 3000 horsepower. Four-corner construc-



tion of two low and two high-pressure cylinders having a single motor and crankshaft has been retained. Turret-type channel valve and simplified arrangement of cylinders and intercoolers are incorporated.

Toggle Clamp

■ Detroit Stamping Co., 3429 Fort street, West Detroit, Michigan, has announced De-Sta-Co toggle clamp with built-in air cylinder. Attached to air line and operated with a Ross air control valve, unit suits fixtures difficult of access or requiring mul-



tiple clamping operations wherein one air valve can be made to control and operate several clamps.

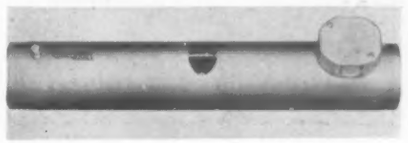
Flight Conveyor

■ Moline Malleable Iron Co., St. Charles, Ill., has built a flight conveyor with long link chain which is in tension rather than in shear when loaded, and thus permits use over long "centers." Throat section of arm has two thick walled pockets, two half or "loop" links with shouldered ends fitting into pockets and a key and cotter pin that hold loop links in place. Loop links are available with various "pitches" to coincide exactly with pitch of chain being used. Conveyors operate in a trough, either horizontally or at inclines up to 55 degrees, and differ from other conveyors in that long link chain is connected into and supported

from flights rather than requiring flight to be fastened on chain. Discharge is made either over head-pulley or through gates in bottom of trough.

Electric Control Valve

■ Wheelco Instruments Co., 1929 South Halsted street, Chicago, has developed a self-contained electric control valve for throttling gas, oil or air flow to furnaces, ovens, etc. Combining valve and operator in a totally enclosed unit, electro-thermal expansion principle of electric valve operates without mechanical movement other than expansion and con-



traction of enclosed operating cylinder. Tapered response curve minimizes hunting.

Files Stainless Steel

■ Nicholson File Co., Providence, R. I., has on the market a file for dense metals as stainless and other alloy steels. Properly used with a light pressure and slow, steady stroke, it lasts much longer than general purpose files on alloy steels.

500-Ton Hydraulic Press

■ Baldwin-Southwark Corp., Eddystone, Pa., offers 500-ton hydraulic presses making 22 short working strokes a minute. Presses have

adjustable stripper in moving down platen and full stroke of 20 inches. Platen area is 48 by 41 inches. Presses can be operated manually, semi-automatically or completely automatically. They are of self-contained, oil operated type. Side housings are of cast steel. Pump, motor and valves, located on top of press, are readily accessible.

Welds Stainless Steel

■ The Lincoln Electric Co., 12818 Coit road, Cleveland, announces an arc welding electrode of 18-8 type having 3½ per cent molybdenum and called "Stainweld" C for welding stainless steels. Coating on electrode prevents oxidation of weld metal. Electrode is made in ⅛, 5/32 and 3/16-inch lengths and sold in 25-pound packages.

Cellulose Sweat Pad

■ American Allsafe Co., Buffalo, N. Y., offers Drybrow sweat pad of fine-pore cellulose sponge bound at ends with tape and equipped with one-piece latex rubber headband. Absorbing 20 times its weight in moisture, it prevents perspiration from trickling into eyes or onto goggles. Preliminary moistening in water provides cooling application and lengthens life of the material. Pad resists chemical action of perspiration and can be washed clean with soap and water and sterilized by boiling without affecting texture or durability.

Name-Plate Stamper

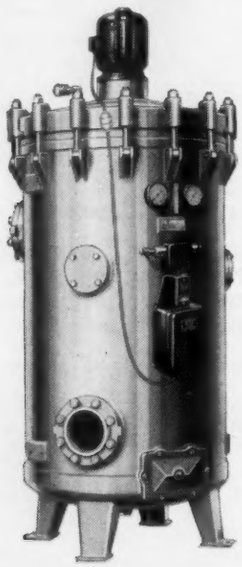
■ H. O. Bates, Elizabeth, N. J., has developed deep throat name plate stamping machine marking plates within a space 4½ by 6 inches but holding plates 8 by 8 inches on standard table. Up and down adjustment for thickness of parts of plates is ½-inch, and distance from back of throat to face of dies is 8 inches. Standard No. 2 machine is available with interchangeable and replaceable dies in any size from 1/16 to 3/16-inch.

Diaphragm Compressor

■ The Electric Sprayit Co., 220 North Broadway, Milwaukee, has introduced its Series 200, ½-horsepower, nonvibrating diaphragm compressors with spraying pressure over 30 pounds. Diaphragm will last over 400 hours. Pop-off valve is included.

Self-Cleaning Filter

■ S. F. Bowser & Co. Inc., Fort Wayne, Ind., has announced Fig. 823 automatic self-cleaning filter for lubricating oils, coolants, etc. Filter



elements are available in different porosities depending upon degree of filtration desired, and capacity of each size can be increased by addition of individual filter elements (up to six). High speed gearing operates in bath of lubricating oil and abrasive material from liquid does not reach it.

Band Saw Packaging

■ Continental Machines Inc., 1301 Washington avenue south, Minneap-

...tells the Story

Translated into terms of pounds of metal removed per pound of wheel wear, number of pieces or total tonnage ground per wheel . . . the fast cutting action of ABRASIVE COMPANY SNAGGING WHEELS means increased production and lower costs in cleaning castings and billets.

U. S. Patent 2,121,656

RED STREAK FLANGES

A new patented feature for resinoid bonded wheels for swing frame and floor stand grinders . . . consisting of two circular steel flanges or plates embedded into the wheel around the center hole . . . provides better fit, truer running, less wear, etc. No extra charge. Write for details.

SIMONDS Famous Family of METAL CUTTING TOOLS

ABRASIVE COMPANY
Division of Simonds Saw and Steel Co.
Tacony and Fraley Sts., Philadelphia, Pa.
Chicago Branch: 1624 South Western Avenue

olis, has developed Doall precision saw carton with an opening in one corner which permits stripping of required saw length from box, keeping remainder intact. Carton holds 300-foot coil of saw blade. Cellophane covered window shows amount remaining. Three hundred types of narrow blade band saw are available.

Portable Hand Grinder

■ The Hisey-Wolf Machine Co., Cincinnati, offers light-weight, portable Grind Hogs operating directly from

standard power line. Motor is totally enclosed. Castings are of high tensile aluminum alloy with steel inserts forming bearing seats. Ground wire is safety feature, and 15-foot extension cord is attached. It is claimed that unit can be handled without any suspension for long periods without fatigue.

Electric Hammer

■ Black & Decker Mfg. Co., Towson, Md., has redesigned its No. 34 portable electric hammer. Tool is self-contained unit powered by universal motor which requires no other extra equipment. Hammer stroke has definite "follow through" action. Hammer weighs 17 pounds, develops 2300 blows per minute and has a capacity in concrete or brick of 1⅛ inches.

Swing-Frame Grinder

■ The F. B. Shuster Co., New Haven, Conn., has developed motor-driven, suspended type swing-frame grinder for heavy grinding work for cleaning up steel billets, etc. Wheels are in three sizes ranging

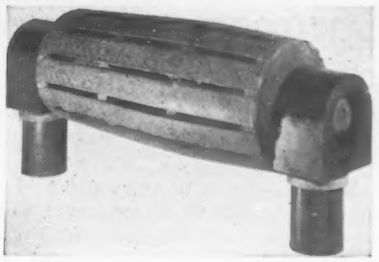
from 16 x 3 inches to 24 x 3 inches. Unit is held by swiveling yoke and can be swung through a complete circle and tilted 90 degrees to the horizontal. Unit may be locked at any angle of tilt. Smallest unit has 5 foot 5 inch centers and overall size of 96 x 22 inches including handles.

Air-Mixer Mounting

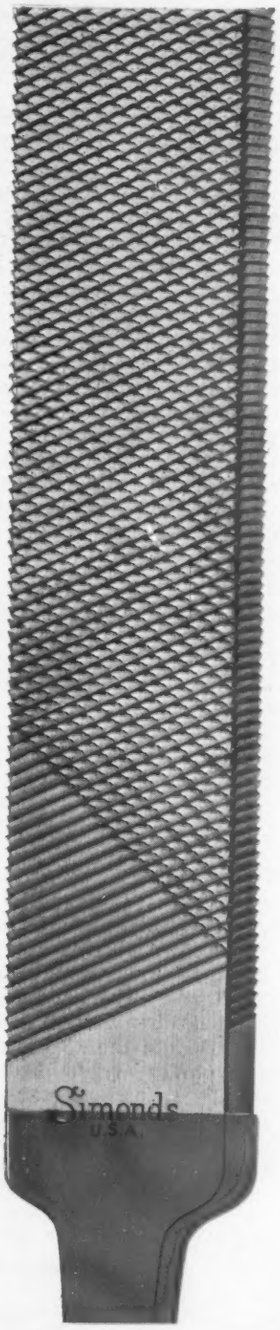
■ The Eclipse Air Brush Co. Inc., 390 Park avenue, Newark, N. J., has a new mounting for Pneumix air-motored agitators for direct drive types. Unit has variable speeds (30 to 6000 revolutions per minute). Laterally swinging cross arm holding air motor with direct drive shaft and propeller is adjustable up and down a vertical bar and can be fixed at any height.

Bearings Resist Acids

■ Gatke Corp., 228 North La Salle street, Chicago, makes bearings and rollers of nonmetallic materials that resist acids and organic solutions for use in pickling tanks for steel and nonferrous metals, agitators in mash tanks and steam cookers of distilleries and breweries, etc. Illustration shows roller and bearing assembly after 11 months service in



an electrolytic pickling tank submerged in acid and subjected to combined effect of hot, dilute sulphuric acid, iron sulfate, electrolytic action, mechanical wear and shock. Pickling acid was the only bearing lubrication.



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European Automotive Experts See Detroit Factories; Hear Papers

■ SCENE of the World Automotive Engineering congress, sponsored by the Society of Automotive Engineers, shifted to Detroit on May 31 when a large delegation of distinguished European engineers arrived in that city to participate in a three-day program of plant visitations and meetings. The group had attended sessions in New York, May 22-28 (STEEL, May 29, p. 64, and June 5, p. 66), then journeyed to Indianapolis, May 30 for the 500-mile automobile race. From Detroit, the party moved on to San Francisco for concluding sessions, June 6-8.

The program in Detroit embraced a visit to the Ford plant on May 31; visits to several Chrysler plants on June 1; an inspection trip to General Motors proving ground at Milford, Mich., on June 2, where a technical session was held in the afternoon; and a banquet at Hotel Statler that evening. W. S. Knudsen, president, General Motors Corp., was principal speaker at the banquet.

"Looking to the future in motor cars," Mr. Knudsen declared, "it is probably correct to assume that generally performance is out ahead of the field and that economy, comfort and safety are factors requiring first attention.

Foresees Lighter Engines

"Rapid development of chassis and body construction has left these units more or less stereotyped with exception of the front system, on which individual springing today is generally accepted. What can be done on the engine nobody knows. We seem to be about stationary at 5 pounds plus per horsepower and manufacturing technique has produced this kind of motor at reasonable cost. However, when you compare aviation engines at 1½ pounds per horsepower, there would seem to be room for progress in the smaller engines—not to 1½ pounds, of course, but say to 4½ pounds.

"Transmissions show a definite trend toward overdrive, both automatic and manual, and the fluid flywheel is just a question of cost. Engines in the rear seem to have reached an impasse for the moment, but the independently sprung rear axle is surely in the picture in the not too distant future. In the body-frame combination, there lies the greatest possibility for weight and cost saving. It would seem that some way could be found to combine body underpan with the frame in one piece and accomplish substantial weight saving without any great sacrifice in structural strength. With the progress made in welding processing, this would seem a reasonable assumption," Mr. Knudsen said.

Two papers were presented at the technical session at the proving ground. E. F. Davis, chief metallurgist, Warner Gear division, Borg-Warner Corp., Muncie, Ind., reviewed new developments in heat treating methods, materials and processes; and Enrique Touceda, consulting engineer, and J. H. Lansing, shop practice engineer, Malleable Founders' society, Cleveland, discussed developments in malleable iron practices and their automotive applications.

First discussing recent improvements effected by steel mills, Mr. Davis examined in considerable detail various types of new steel analyses and treatments; then proceeded to elaborate on new types of heat treating furnaces. Quoting in part from his remarks, he stated:

"Of recent years there has been increased trend toward employment of fine-grained steels and a demand on steel mills for grain control. Certain types are normally fine grained, such as the chrome-vanadium steels, whereas others are normally coarse. But to make the majority of the alloy steels coarse or fine grained to demand, is a recent accomplishment.

"In both carbon and alloy steels of fine-grain microstructure the problem of machining has been a difficult one where smoothly machined surfaces are prerequisite, such as gear teeth. To improve this condition attempts are being made to introduce other elements into steel to compensate for fineness of grain and inherently stringy characteristics.

Better Machinability Sought

"Many of the rarer elements have been tried and some have shown promise but elements such as zirconium, selenium, columbium and uranium are prohibitive additions for production steels although some of these are used in the 18-8 stainless steels and have proved aids to machining properties. Zirconium in small quantities has been found beneficial in improving machinability in the higher manganese steels. An important contribution to this problem came out of the steel containing lead.

"To improve physical properties by elimination of oxides nitrogen and other gases and to promote coalescence of inclusions, several new deoxidizers are being employed.

"Composition of these deoxidizers is not of general interest except as they indicate the tremendous amount of work that is being done to improve steel quality.

"In many automobile plants the trend has been toward cheaper steels. Several have almost entirely eliminated use of alloy steels and have substituted what might be termed the deluxe high-manganese carbon steels made with special deoxidizers. These steels vary from 1.30 to 1.90 per cent manganese corresponding to the S.A.E. 1300 series. These new manganese steels are an improvement over the older type although the actual chemistry of the steel has not been greatly modified. Even transmission and rear axle gears are being fabricated from these steels. Their success requires accurate control of grain size, hardenability and physical properties.

"Heat treatment of steel has also progressed equally to the advancement in steel metallurgy. One important contribution to modern heat treatment practice has been the internally-heated pot furnace for hardening in cyanide and activated baths.

New Gas Carburizing Units

"Gas carburizing is fast making inroads into the box or pack carburizing process. Although gas as a carburizing medium is not new, yet the modern gas carburizing unit is distinctly new. Unlike former designs these are complete heat treating units which will automatically carburize, quench, wash and temper. These newest installations usually are found in the larger production plants where frequently 2 to 6 units are in operation and where there is a steady flow of parts.

"Actual cost of carburizing with gas is so low to be almost negligible. But the high expense comes in the large amount of alloy necessary for operation including trays, fixtures and particularly the muffle which in the larger units are 35 to 40 feet long made up of welded sections and costing from $6000 to $7500 each. If a life of approximately 12,000 heat-hours is obtained excellent economy is possible but if frequent renewals of muffles are necessary it might prove an expensive method of carburizing. Alloy manufacturers have recognized the necessity for soundness and both the furnace builders and users of these units have been demanding these be given an X-ray examination before acceptance.

"To combat the high cost of alloy muffles there is one installation in a General Motors plant in Indiana where no alloy muffle is employed but instead the carburizing chamber is made of firebrick selected

ADVERTISING PAGES REMOVED

for its freedom from iron. Prior investigation had shown that such firebrick would have no unfavorable reaction with furnace gases. The furnace is heated by a series of staggered burners which inject flame into 14 cylinders about 12 inches in diameter and 5 feet long connected with flues at the bottom of the furnace. The chamber, which is about 35 feet long, is heated by the radiance from these heated cylinders.

"Work is pushed on skid rails set on piers over the radiant cylinders. Placing of the radiant cylinders below the work with the colder metal above was for the purpose of stimulating a cycloidal flow of the carburizing gas.

"This furnace has been in operation about 1½ years and is the first of the type without an alloy muffle. So far it has given a good account of itself. One of its features is the rapidity the radiant cylinders may be replaced. In event of a leakage these can be taken out and replaced in a few hours without seriously tying up production. A muffle failure, on the other hand, would necessitate several weeks delay for replacement in addition to high cost.

"Employment of radiant heating is on the increase. It is particularly useful in furnaces where the product would be injured by contact with combustion gases such as vitreous enameling and where atmospheres are employed to protect the surface of heated metal.

Wide Use of Radiant Tubes

"Radiant tubes are used in many different types of furnaces. Sheet steel annealing perhaps leads the list but they are also employed in axle hardening furnaces, bar heat treating furnaces, galvanizing pots and type metal melting. A recent application has been for malleable iron annealing in both stationary and continuous types."

Discussing Mr. Davis' paper, R. J. Cowan, metallurgist, Surface Combustion Corp., Toledo, O., said that from the viewpoint of a producer of heat treating equipment, it appears the significant advancements in heat treating may be classified in four main divisions as follows: (1) Utilization of special atmospheres; (2) mechanization of furnaces; (3) case hardening by gases, and (4) radiant tube heating.

A review reveals the great changes that have taken place in manufacture of industrial furnaces, he continued. From piles of brick with a few burners inserted, furnaces have been developed into specialized heat treating machines of considerable mechanical excellence. This development has depended upon use of heat-resisting alloys of superior types and special refractories and insulating materials. Along with these have come improved methods for burning gases and various new types of muffle construction.

W. A. Darrow, Continental Industrial Engineers, Chicago, cited as his opinion that there are three schools of thought with respect to gas carburizing; one believes in coating the product with soot which is burned off before the part emerges from the furnace; a second controls the amount of carbon deposit on the product by addition on inert gases to the furnace atmosphere; and the third believes in producing no carbon deposit, preferring to keep the diluent gas in the furnace hotter than the metal, then to add a controlled amount of carburizing gas at the hottest point in the furnace. With reference to the mechanism of carburization, he advanced the suggestion that it perhaps proceeded from the formation of iron carbonyl in the furnace.

Alloy Steels May Return

O. W. McMullan, Youngstown Sheet & Tube Co., Chicago, observed that advances in heat treating methods and equipment had improved the position of the carbon steels and low-alloy steels for use in automotive parts. He added that possibly in the future will come a swing back to increased use of the true alloy steels which today in many cases have been dropped in favor of the less expensive carbon steels.

First use of malleable iron in automotive construction was in hubs, stated Messrs. Touceda and Lansing. Characteristics and adequacy of the material demonstrated in this important element attracted attention of designers, and use was immediately made of malleable in many other chassis and body parts. Rear axle assemblies, differential carriers, cases, bearing caps and brake supports are now cast in this shock-resistant metal.

In the important steering gear assemblies, malleable iron serves as a safeguard in housings, supports and brackets. It plays a similar role in spring hangers, spring clips and seats, steering post brackets, bumper brackets, brake and clutch pedals and brackets, wheel carriers and various body parts. It affords strength, resistance to impact and economy in shock absorbers, radiator inlets and outlets, exhaust pipe flanges, generator and fan assembly supports. This shock and corrosion resistant and easily machinable material well serves the two purposes of dependability and economy, the authors asserted.

Modifications of normal malleable iron, known as pearlitic malleables, have for the past few years been produced for use when wearing properties accompanied by a reasonable amount of toughness are in demand. The product has a matrix which consists of silico-ferrite and pearlite or sorbite and may contain some spheroidized cementite. Much depends upon the character of the matrix as to the mechanical properties. Briefly the ultimate strengths vary from between about 60,000 to 90,000 pounds per square inch, the elongation in the former averaging around 12 per cent and in the latter not more than 3 per cent.

In general, pearlitic malleable has higher average yield point and ultimate strength and lower elongation than normal malleable iron. It machines less readily and has a higher indentation hardness. Applications include use where rigidity and wear resistance are important factors, such as in gears, sprockets, air tools and wearing pads.

Some malleable iron producers, it was pointed out, also are engaged in the manufacture of the conventional type of malleable iron to which usually is added a small amount of copper and molybdenum. These alloy castings have found numerous applications, since they have a yield point that approximates 45,000 pounds per square inch and an ultimate strength in the vicinity of 62,000 pounds per square inch, accompanied by an elongation in some instances as high as 20 per cent.

Protective Link

■ The ability to carry peak overloads, and at the same time to disconnect transformers automatically from power lines in case of internal trouble, is made available by a new protective link between bushing terminal and winding, developed by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Despite their small size, three of them can interrupt 500,000 kilovolt-amperes, 3-phase, at the first zero point of current. Several sizes of these links make the scheme applicable to transformers of from 2400 to 66,000 volts. Very definite thermal characteristics permit this link to be co-ordinated with other current-disconnecting devices on the system, in addition to permitting transformer to carry useful peak overloads.

Fast-Baking Enamel

■ To enable manufacturers to speed up production by reducing time needed for finishing, Maas & Waldstein, Newark, N. J., offer "Polydur" synthetic enamels in white and all colors for spraying or dipping with very short baking schedules. Enamels set out of dust in a few minutes. Baking schedules depend upon temperature; at 325 degrees Fahr., enamels bake to a fine finish without discoloration in 15 minutes.

Subways Offer Market For Enameling Sheets

■ More extensive use of porcelain enamel and enameling sheets in vehicular tunnels is indicated by the Porcelain Enamel institute, Chicago, as result of a recent inspection of the lining of the Detroit-Canada tunnel by Robert W. Hunt Co., inspection engineers, Chicago.

The institute points out that 6000 tons of enameling sheets would be required if porcelain enameling were specified for three large projects now underway—the Chicago subway, the Sixth avenue subway in New York, and the Pennsylvania all-weather highway between Pittsburgh and Harrisburg. Lining material for these projects have not yet been selected.

Hunt Co. engineers reported "the present condition of the porcelain enamel steel tile in the Detroit-Canada tunnel, together with information on conditions of installation, exposure, replacement and service, lead to the conclusion that porcelain enamel steel tile can be furnished which, properly installed by competent craftsmen, will form a lining eminently suitable for all the requirements of subaqueous vehicular tunnels."

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OVER HEAD HANDLING EQUIPMENT

FOR ALL TYPES OF CLEANING AND PICKLING

● Handling Cost is the largest item of many manufacturing processes. Raw material, to-storage, to processing or the product through the various processes must be handled. Cleveland Tramrail has been successfully adapted to these handling problems in many industries. The one illustrated here - Cleaning Enamel Ware Blanks, prior to enameling, is via a hand propelled carrier with motor operated hoist, rope controlled.

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Open-Hearth Practice Is Subject of Conference

■ Sixth in a series of open forums on open-hearth problems was held in the bureau of mines auditorium, Pittsburgh, June 2, under sponsorship of the National Open Hearth committee, American Institute of Mining and Metallurgical Engineers. Questions covering refractories, steel pouring practice, open hearth slag control, acid melting practice, and general practice were discussed.

Highlight of the meeting was a paper by Dr. John Chipman, professor of physical metallurgy, Massachusetts Institute of Technology, Cambridge, Mass., on the oxidizing power of slag. The speaker emphasized that the research which he and his colleagues are pursuing on the effects of slag in the open hearth is far from complete; many factors still need to be investigated thoroughly before the actual oxidizing power of slag can be determined.

Considerable interest on steel pouring practice was displayed, with values of etch tests commanding the most time. No standard practice seems to be followed with regard to the etch test and considerable difference of opinion exists as to the exact value of this test.

Several methods of minimizing pipe in ingots were discussed with particular emphasis on the practice in connection with small ingots of from 10 to 15 tons. Mold design, use of compounds, portable torch, and other methods were considered.

Resistance Welding Tip

■ A new type welding tip developed by P. R. Mallory & Co. Inc., Indianapolis, now is available for resistance welding of all kinds in a complete range of standard sizes and designs. It is the result of extensive research work conducted in co-operation with resistance welding machine manufacturers and users of resistance welding. It embodies tip forms, water hole depths, wall thicknesses and other features that prolong life of the tips and improve their efficiency. Tips are made by a new process which yields uniform strength, hardness and electrical and thermal conductivity. Water hole has a round bottom, with no corners to trap steam. This company also announces complete standardization of its water-cooled holders.

■ Factory sales of mechanical stokers in April, reported to bureau of the census, numbered 3591, compared with 3837 in March, 3628 in April, 1938, and 6082 in April, 1937. Sales for four months totaled 13,576, compared with 12,435 in the corresponding period last year.

Pallets and Trucks

(*Concluded from Page* 54)

handlings from point of manufacture to point of use.

In this instance the use of pallets reduced these handling operations by 50 per cent. Now the bolts are loaded onto pallets in the screw machine department and transferred to the stockroom where the pallets are piled six or seven high. From this point they are delivered to the job when needed, being handled through all these operations as a group. Fig. 2 shows one of the double-faced pallets loaded with rim bolts and placed on the trailer with another pallet on the fork truck ready to be placed on the trailer also. Use of double-faced pallets permits stacking the units. Here again there are comparatively few units but the savings due to the improved method are substantial.

Another efficient use of pallets is in the handling of boxed copper strip as well as edgewise-wound copper coils. Previously, boxes of copper strip were handled by crane, one by one. Now they are placed on a wooden pallet which permits handling them four at a time, using a fork truck. See Fig. 3.

Handling edgewise wound copper coils was similarly improved. They were formerly handled, one by one, with a crane, they are now handled four at a time on the pallets, Fig. 4. In addition to the substantial saving in time by the new method, the possibility of damaging the coils is greatly reduced, due to the fewer number of handlings required.

Many material handling devices can be utilized during their spare time for other purposes than materials handling, it has been found. One interesting application is the handling of heavy punches and dies. Using the crane ties up that important piece of equipment for considerable time. The fork type battery truck can readily be used for handling the heavy punches and dies, thus freeing the crane for other work.

Electrotinning Strip

(*Concluded from Page* 57)

3. Fused electrotinplate applied directly on the steel base.
4. Unfused semibright electrotinplate.
5. Unfused semibright scratch-brushed electrotinplate.

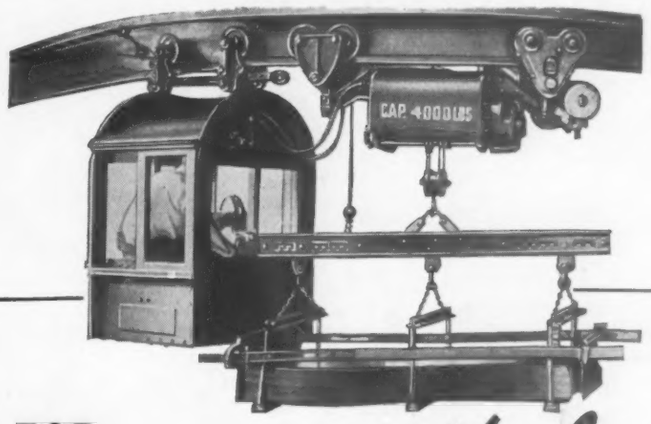
Unfused semibright electrotinplate is produced directly from the plating bath. This product appears suitable for many commercial applications such as for dry-pack cans and specialities; also, if a coating of suitable lacquer is applied, it may be used for certain wet-pack products.

Fused electrotinplate, type 3 above, applied directly to the steel base commands the most attention because it combines low cost with a high degree of quality in the coated product. Remainder of this article is devoted exclusively to this type of tinplate.

The recommended method for continuous production of fused electrotinplate is as follows: Steel strip is taken in coils from the temper mill and mounted on two payout reels. The strip is fed continuously to the tinning line alternately from the two payout reels, the trailing end of the preceding strip being attached to the leading end of the succeeding strip by multiple spot welding—sufficient strip storage being provided in a slack producer to allow time for the welding operation.

In the tinning line, the strip is first subjected to a thorough cleaning by the oxide electrocleaner, as previously described; followed by an acid pickle, rotating brushes and a water rinse. This produces a chemically clean surface.

The cleansed strip then is passed directly into the electrotinning apparatus where it receives a fine-



FOR *Extra Long Hauls* choose the CAB CONTROLLED
A-E-CO LO-HED HOIST

When — 1. Hauls are exceptionally long. 2. Many bays must be served. 3. The path under hoist is obstructed. 4. Speed is essential —

The motor trolley, cab controlled A-E-CO Lo-Hed Hoist — motor trolley with cab trailer — is the best to use.

For high-lights of this hoist see A-E-CO POINTS (below). For full details of Lo-Hed hoists, send for our new catalog today.

AE CO POINTS

- Lo-Heds range from ¼ to 12 ton capacities. (Above available from 1 to 6 tons).
- Operates on Standard I-beam or track of any make.
- Low headroom—stacks materials higher than any other hoist.
- Safe, fool-proof.
- Compact, strong, simply constructed.
- Protected against dust, moisture, fumes.
- Heavy duty, ball-bearing HOIST SERVICE motors.
- Automatic lowering brake.
- Ball or roller bearings at vital points.
- Improved plow-steel cable.
- 100% positive automatic stop.
- Indoor (open) and Outdoor (glazed) cabs.
- Efficient spur-gear drive . . . and

LO-HED COSTS LESS PER LIFT

OTHER A-E-CO PRODUCTS: Taylor Stokers, Marine Deck Auxiliaries, Hele-Shaw Fluid Power.

A-E-CO Lo-Hed HOISTS

AMERICAN ENGINEERING COMPANY

2484 ARAMINGO AVENUE, PHILADELPHIA, PA.

grained deposit of pure metallic tin, evenly distributed over the strip surface.

After suitable rinsing and drying the electrotinned strip enters an oil bath heated to a temperature slightly below the melting point of tin. It then is subjected to a second hot oil bath with a temperature above the melting point of tin, wherein the coating is fused; afterwards it is passed directly into a cold oil bath to solidify the tin before crystal growth can occur.

Next the oil is removed from the fused electrotinplate by a solvent cleaner. Cleaned tinplate then runs through a flattening and cutting machine, where it is cut to the desired length, and is delivered to the classifier.

Tinplate produced by this method can be varied from less than ¼-pound of tin per base box to 2 or 3 pounds or more, depending on specific requirements. It is quite bright, relatively free from porosity and can be soldered easily. The figures in Table I are an average of several identical hydrogen evolution tests on this fused electrotinplate, without undercoating.

The tin coating of the fused electrolytic product is uniform. There are no "drip edges". The deposited surface is practically 100 per cent pure. This is important in service as the corrosion of tinplate is dependent on the electrolytic action set up by the impurities in the tin and the acid or alkaline medium of the food product.

This electrotinning method has high speed of operation, making possible large tonnage production from a single tinning line with, it is believed, low production costs. Present design of electrotinning line is for strip speeds up to 400 feet per minute with tonnage output of 96 tons of finished tinplate per 8-hour turn.

Added to these mechanical, operating, and quality advantages is the large factor of tin cost. There is almost no tin loss in the fused electrolytic method. Appreciable savings in tin cost and large reductions in tin inventories are thus achieved, while the quality of the tinplate is improved.

NELOY-MOLYBDENUM STEEL CYLINDER AND PISTON HEAD CASTINGS

VERSATILITY
in Rough Castings
Another reason leading industrialists specify National-Erie Corporation to fill rush orders for industrial steel castings is the versatility of the National-Erie production setup . . . For instance, special orders, large or small, for steel-mill equipment castings, castings for overhead cranes, for power shovels and power presses . . . National-Erie's electric steel foundries are equipped with furnaces for elasticity in production schedules . . . without disturbing the constant flow of heavy production in the open hearth foundries . . . and Neloy steel castings for special applications . . . rough, finished, heat treated, or flame hardened . . . are produced as specified within the walls of the National-Erie Corporation plant under one unified control and one responsibility.
Send for your copy of Bulletin No. 5. Your orders, large or small, will be filled promptly.
NATIONAL-ERIE
CORPORATION
ERIE, PA., U.S.A.

Weld Galvanized Sheet

(*Concluded from Page* 51)

confined spaces, masks that supply air from an outside source should be worn by the operator. A satisfactory type is a simple mask with a large hose leading only the distance necessary to assure a pure air supply. This type does not require an air pump.

In the Southwestern part of the country, welded galvanized pipe systems have been in service many years and no indication of accelerated corrosion has been noted. A grain elevator in this same territory has a great many galvanized chutes which have been constructed by bronze welding. Grain often is damp and some clings to the walls of the chute. Even though such a situation is highly conducive to corrosion, these chutes are still in excellent operating condition.

A company, that for many years has been manufacturing pit-type acetylene generating units for house-lighting, employs bronze welding for joining galvanized steel shells. Thousands of these units, buried throughout the country under varying conditions, are subject internally to water of varying corrosive intensity and to soil conditions externally. Welding appears to impair them in no way.

Another company that uses bronze welding in manufacture of large quantities of galvanized culvert specials for county and state highway departments also reports the serviceability of welded galvanized joints. This type of construction passes all the tests which state, county and federal specifications require.

Demand Steady Or Slightly Heavier

Steelmaking Rises But Subsequent Gains Seen Smaller

MARKET IN TABLOID ★

Demand
Well sustained; flat-rolled releases increasing.

Prices
Some concessions still prevail; scrap up sharply.

Production
Up 1½ points to 53½ per cent.

■ CHANGES in finished steel demand generally are for the better. Releases against flat-rolled steel orders are increasing gradually, and moderate gains have appeared in requirements of some miscellaneous users.

Ingot production has extended its recent upturn to 53½ per cent, a 1½-point rise for the week, and comparing with 25½ per cent a year ago. This marks an increase of 8 points the past three weeks, but subsequent gains this month are likely to be small. Some districts plan unchanged schedules at least until after July 4.

Operations will be retarded for a number of weeks by light consumption in the automotive industry, despite attempts by mills to accelerate shipments of low-price sheet and strip backlogs. Until the model changeover period has been bridged other steel consumers must provide the principal support to production.

Termination of the Briggs strike not only helped to push automobile assemblies up sharply last week but permits the resumption of tool and die work for new models. However, possibility is seen of additional disturbances among tool and die workers through union demands on other motor companies.

Motorcar assemblies of 65,265 units last week more than doubled those of the preceding holiday period and were 62.5 per cent larger than a year ago. General Motors increased from 23,670 to 30,640, Chrysler from 1100 to 8145, Ford from 1600 to 17,660 and all others from 6075 to 8820.

Fair Activity Continues In Heavy Steel Products

Heavier steel products continue rather prominent in market developments. Shipments of structural shapes and concrete reinforcing bars show further gains and new business continues fairly heavy despite a falling off in awards last week from the peak level of the week before. Texas Corp. has placed a 7000-ton pipe line. Lehigh & New England railroad has ordered 50 freight cars, and the Milwaukee road has bought 8500 tons of steel for 1000 box cars it will build. The Pennsylvania will build 25 locomotive tenders. Rail orders include 2000 tons for the Reading-Central of New Jersey. New inquiries for track material and equipment are small but nearly 3000 freight cars are pending for three roads.

Tin plate specifications continue active, with production holding at 70 per cent. Peak of the season in demand and operations is believed near, but heavy shipments are in prospect for a number of weeks.

Foundry Operations Trail Rise In Steel Production

Foundry operations are lagging behind the steelmaking trend, and pig iron shipments so far this month are no better than steady compared with May. In some districts seasonal curtailment of foundry schedules is reflected in a decrease in the iron movement. Pig iron sellers are quoting unchanged prices on what little third quarter business is appearing.

Finished steel prices still are subject to concessions in certain instances. In addition to almost habitual weakness in reinforcing bars, plate quotations are being shaded, and official levels on sheets are not yet firmly established. Because of previous coverage new business in flat-rolled products is scant, but shipments are the heaviest since March.

Leading scrap markets are more active, demand being stimulated by recent gains in steelmaking. Higher prices accompany improved buying, and increases at Chicago, Pittsburgh and Philadelphia have moved the scrap composite up 62 cents to $14.62. This is the highest in nine weeks.

Ingot production was heavier in most centers last week. Pittsburgh increased 1 point to 43 per cent and Youngstown was up 3 points to 51. Other gains included 3 points to 73 at Wheeling, 7 points to 67 at Birmingham, 5 points to 40 in New England, 8 points to 68 at Cincinnati and 9½ points to 47 at St. Louis. Chicago declined 1 point to 52½. Unchanged districts were eastern Pennsylvania at 37, Cleveland at 53, Buffalo at 44 and Detroit at 57.

The finished steel price composite is unchanged at $55.70.

COMPOSITE MARKET AVERAGES

	June 10	June 3	May 27	One Month Ago May, 1939	Three Months Ago March, 1939	One Year Ago June, 1938	Five Years Ago June, 1934
Iron and Steel	$35.72	$35.59	$35.63	$35.80	$36.40	$38.41	$32.96
Finished Steel	55.70	55.70	55.70	56.00	56.50	61.55	55.08
Steelworks Scrap..	14.62	14.00	14.00	14.05	14.98	10.89	10.32

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	June 10, 1939	May 1939	March 1939	June 1938
Steel bars, Pittsburgh	2.15c	2.20c	2.25c	2.45c
Steel bars, Chicago	2.15	2.20	2.25	2.40
Steel bars, Philadelphia	2.47	2.52	2.57	2.47
Iron bars, Terre Haute, Ind.	2.05	2.10	2.15	2.35
Shapes, Pittsburgh	2.10	2.10	2.10	2.25
Shapes, Philadelphia	2.215	2.21½	2.21½	2.40¼
Shapes, Chicago	2.10	2.10	2.10	2.25
Plates, Pittsburgh	2.10	2.10	2.10	2.25
Plates, Philadelphia	2.15	2.15	2.15	2.371
Plates, Chicago	2.10	2.10	2.10	2.25
Sheets, hot-rolled, Pittsburgh	2.00	2.05	2.15	2.40
Sheets, cold-rolled, Pittsburgh	3.05	3.10	3.20	3.45
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.75
Sheets, hot-rolled, Gary	2.00	2.03	2.15	2.40
Sheets, cold-rolled, Gary	3.05	3.08	3.20	3.20
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.80
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.90
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.35
Wire nails, Pittsburgh	2.45	2.45	2.45	2.75

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$37.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	37.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	37.00
Wire rods, No. 5 to ⅜-inch, Pitts.	43.00	43.00	43.00	47.00

Pig Iron

	June 10, 1939	May 1939	March 1939	June 1938
Bessemer, del. Pittsburgh	$22.34	$22.34	$22.34	$25.34
Basic, Valley	20.50	20.50	20.50	23.50
Basic, eastern, del. Philadelphia	22.34	22.34	22.34	25.34
No. 2 foundry, Pittsburgh	22.21	22.21	22.21	25.21
No. 2 foundry, Chicago	21.00	21.00	21.00	24.00
Southern No. 2, Birmingham	17.38	17.38	17.38	20.38
Southern No. 2, del. Cincinnati	20.89	20.89	20.89	23.89
No. 2X, del. Phila. (differ. av.)	23.215	23.215	23.215	26.215
Malleable, Valley	21.00	21.00	21.00	24.00
Malleable, Chicago	21.00	21.00	21.00	24.00
Lake Sup., charcoal, del. Chicago	28.34	28.34	28.34	30.34
Gray forge, del. Pittsburgh	21.17	21.17	21.17	24.17
Ferromanganese, del. Pittsburgh	85.33	85.33	85.27	107.77

Scrap

Heavy melting steel, Pittsburgh	$15.25	$14.55	$15.75	$11.40
Heavy melt. steel, No. 2, E. Pa.	13.25	12.75	13.40	9.90
Heavy melting steel, Chicago	13.75	12.75	14.25	10.25
Rails for rolling, Chicago	17.75	17.25	17.25	14.90
Railroad steel specialties, Chicago	15.50	14.75	16.25	13.50

Coke

Connellsville, furnace, ovens	$3.75	$3.75	$3.75	$3.90
Connellsville, foundry, ovens	5.00	5.00	5.00	5.05
Chicago, by-product fdry., del.	10.50	10.50	10.50	11.00

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel

Hot Rolled

Pittsburgh	2.00c
Chicago, Gary	2.00c
Cleveland	2.00c
Detroit, del.	2.00c
Buffalo	2.00c
Sparrows Point, Md.	2.00c
New York, del.	2.24c
Philadelphia, del.	2.17c
Granite City, Ill.	2.10c
Middletown, O.	2.00c
Youngstown, O.	2.00c
Birmingham	2.00c
Pacific Coast points	2.50c

Cold Rolled

Pittsburgh	3.05c
Chicago, Gary	3.05c
Buffalo	3.05c
Cleveland	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.37c
New York, del.	3.39c
Granite City, Ill.	3.15c
Middletown, O.	3.05c
Youngstown, O.	3.05c
Pacific Coast points	3.65c

Galvanized No. 24

Pittsburgh	3.50c
Chicago, Gary	3.50c
Buffalo	3.50c
Sparrows Point, Md.	3.50c
Philadelphia, del.	3.67c
New York, delivered	3.74c
Birmingham	3.50c
Granite City, Ill.	3.60c
Middletown, O.	3.50c
Youngstown, O.	3.50c
Pacific Coast points	4.00c

Black Plate, No. 29 and Lighter

Pittsburgh	3.05c
Chicago, Gary	3.05c
Granite City, Ill.	3.15c

Long Ternes No. 24 Unassorted

Pittsburgh, Gary	3.80c
Pacific Coast	4.50c

Enameling Sheets

	No. 10	No. 20
Pittsburgh	2.75c	3.35c
Chicago, Gary	2.75c	3.35c
Granite City, Ill.	2.85c	3.45c
Youngstown, O.	2.75c	3.35c
Cleveland	2.75c	3.35c
Middletown, O.	2.75c	3.35c
Pacific Coast	3.35c	3.95c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	24.00	25.00
Plates	27.00	29.00
Sheets	34.00	36.00
Hot strip	21.50	23.50
Cold strip	28.00	30.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	18.50	19.00	22.50	27.50
Plates	21.50	22.00	25.50	30.50
Sheets	26.50	29.00	32.50	36.50
Hot strip	17.00	17.50	23.00	28.00
Cold stp.	22.00	22.50	28.50	36.50

Steel Plate

Pittsburgh	2.10c
New York, del.	2.19-2.29c
Philadelphia, del.	2.15c
Boston, delivered	2.42c
Buffalo, delivered	2.33c
Chicago or Gary	2.10c
Cleveland	2.10c
Birmingham	2.10c
Coatesville, base	2.10c
Sparrows Point, base	2.10c
Claymont, del.	2.10c
Youngstown	2.10c
Gulf ports	2.45c
Pacific Coast points	2.60c

Steel Floor Plates

Chicago	3.35c
Gulf ports	3.70c
Pacific Coast ports	3.95c
Pittsburgh	3.35c

Standard Shapes

Pittsburgh	2.10c
Philadelphia, del.	2.21½c
New York, del.	2.27c
Boston, delivered	2.41c
Bethlehem	2.10c
Chicago	2.10c
Cleveland, del.	2.30c
Buffalo	2.10c
Gulf ports	2.45c
Birmingham	2.10c
St. Louis, del.	2.34c
Pacific Coast points	2.70c

Tin and Terne Plate

Tin Plate, Coke (base box)

Pittsburgh, Gary, Chicago	$5.00
Granite City, Ill.	5.10

Mfg. Terne Plate (base box)

Pittsburgh, Gary, Chicago	$4.30
Granite City, Ill.	4.40

Bars

Soft Steel

(*Base, 3 to 20 tons*)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Duluth	2.25c
Birmingham	2.15c
Cleveland	2.15c
Buffalo	2.15c
Detroit, delivered	2.25c
Philadelphia, del.	2.47c
Boston, delivered	2.52c
New York, del.	2.49c
Gulf ports	2.50c
Pacific Coast points	2.75c

Rail Steel

(*Base, 15 to 50 tons*)

Pittsburgh	2.00c
Chicago or Gary	2.00c
Detroit, delivered	2.10c
Cleveland	2.00c

Buffalo	2.00c
Birmingham	2.00c
Gulf ports	2.35c
Pacific Coast points	2.60c

Iron

Chicago, Terre Haute	2.05c
Philadelphia	2.37c
Pittsburgh, refined	3.50-8.00c

Reinforcing

New billet, straight lengths, quoted by distributors

Chicago, Gary, Buffalo Cleve., Birm., Young., Sparrows Pt., Pitts.	1.90-2.05c
Detroit, delivered	2.00-2.15c
Gulf ports	2.25-2.40c
Pacific coast ports	2.50c
Philadelphia, del.	2.07-2.22c

Rail steel, straight lengths, quoted by distributors

Pittsburgh, Gary, Chicago, Buffalo, Cleveland, Birm.	1.75-1.90c
Detroit, delivered	1.85-2.00c
Gulf ports	2.10-2.25c
Pacific Coast	2.35c

Wire Products

Pitts.-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard wire nails	$2.45
Cement coated nails	$2.45

(Per pound)

Polished staples	3.15c
Galv. fence staples	3.40c
Galv. barbed wire, standard 12½ gage two-point hog, 80-rod spool $2.80; two-point cattle, 80-rod spool	$2.62
Annealed fence wire	2.95c
Galv. fence wire	3.35c
Woven wire fencing (base C. L. column)	67.00
Single loop bale ties, (base C. L. column)	56.00

To Manufacturing Trade

Base, Pitts. - Cleve. - Chicago-Birmingham (except spring wire)

Bright bess., basic wire	2.60c
Galvanized wire	2.65c
Spring wire	3.20c

Worcester, Mass., $2 higher on bright basic and spring wire.

Cut Nails

Carloads, Pittsburgh $3.60

Cold-Finished Bars

	Carbon	Alloy
Pittsburgh	2.65c	3.35c
Chicago	2.65c	3.35c
Gary, Ind.	2.65c	3.35c
Detroit	2.70c	*3.45c
Cleveland	2.65c	3.35c
Buffalo	2.65c	3.35c

*Delivered.

Alloy Bars (Hot)

(Base, 3 to 25 tons)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem	2.70c
Detroit, delivered	2.80c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.55	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo.	0.55
4600 0.20 to 0.30 Mo. 1.50-2.00 Ni.	1.10
5100 0.80-1.10 Cr.	0.45
5100 Cr. spring flats	0.15
6100 bars	1.20
6100 spring flats	0.85
Cr. N., Van.	1.50
Carbon Van.	0.85
9200 spring flats	0.15
9200 spring rounds, squares	0.40

Electric furnace up 50 cents.

Strip and Hoops

(Base, hot-rolled, 1 to 20 tons; cold-rolled, 3 to 25 tons)

Hot Strip, 12-inch and less

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham	2.00c
Detroit, del.	2.10c
Philadelphia, del.	2.32c
New York, del.	2.36c
Cooperage hoop, Youngs., Pitts.; Chicago, Birm.	2.10c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown	2.80c
Chicago	2.90c
Detroit, del.	2.90c
Worcester, Mass.	3.00c

Carbon	Cleve., Pitts.
0.26—0.50	2.80c
0.51—0.75	4.30c
0.76—1.00	6.15c
Over 1.00	8.35c

Worcester, Mass $4 higher.

Commodity Cold-Rolled Strip

Pitts.-Cleve.-Youngstown	2.95c
Detroit, del.	3.05c
Worcester, Mass.	3.35c

Lamp stock up 10 cents.

Rails, Fastenings

(Gross Tons)

Standard rails, mill	$40.00
Relay rails, Pittsburgh 20—100 lbs.	32.50-35.50
Light rails, billet qual., Pitts., Chicago, B'ham.	$40.00
Do., rerolling quality	39.00

Cents per pound

Angle bars, billet, mills	2.70c
Do., axle steel	2.35c
Spikes, R. R. base	3.00c
Track bolts, base	4.15c
Car axles forged, Pitts., Chicago, Birmingham	3.15c
Tie plates, base	2.15c

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade as per Dec. 1, 1932, lists, carloads 5% up; full containers additional 10%.

Carriage and Machine

½ x 6 and smaller	68.5 off
Do. larger, to 1-in.	66 off
Do. 1⅛ and larger	64 off
Tire bolts	52.5 off

Stove Bolts

In packages with nuts attached 72.5 off; in packages with nuts separate 72.5-12½ off; bulk 84 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	60 off
Elevator bolts	60 off
Plow bolts	68.5 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
6-inch and less	67	70
⅞-1-inch	64	65
1⅛ and larger	62	62

Hexagon Cap Screws

Upset, 1-in., smaller	67.5 off

Square Head Set Screws

Upset, 1-in., smaller	75.0 off
Headless set screws	70.0 off

Piling

Pitts., Chgo., Buffalo	2.40c
Gulf ports	2.75c

Rivets, Washers

Structural, Pittsburgh, Cleveland, Chicago	3.40c
⅞-inch and smaller, 11 and 12	63½ 54
Pitts., Chi., Cleve.	65-10 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. $5.40; c.l. $5.75 off	

Welded Iron, Steel Pipe

Base discounts on steel pipe. Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

Steel

In.	Blk.	Galv.
½	63½	54
¾	66½	58
1—3	68½	60½

Iron

¾	30	13
1—1¼	34	19
1½	38	21½
2	37½	21

Lap Weld

Steel

2	61	52½
2½—3	64	55½
3½—6	66	57½
7 and 8	65	55½
9 and 10	64½	55

Iron

2	30½	15
2½—3½	31½	17½
4	33½	21
4½—8	32½	20
9—12	28½	15

Line Pipe

Steel

1 to 3, butt weld	67½	
2, lap weld	60	
2½ to 3, lap weld	63	
3½ to 6, lap weld	65	
7 and 8, lap weld	64	
10-inch lap weld	63½	
12-inch, lap weld	62½	

Iron

	Blk.	Galv.
¾ butt weld	25	7
1 and 1¼ butt weld	29	13
1½ butt weld	33	15½
2 butt weld	32½	15
1½ lap weld	23½	7
2 lap weld	25½	9
2½ to 3½ lap weld	26½	11½
4 lap weld	28½	15
4½ to 8 lap weld	27½	14
9 to 12 lap weld	23½	9

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½" O. D.	13	$ 9.72	$23.71
1¾" O. D.	13	11.06	22.93
2" O. D.	13	12.38	19.35
2¼" O. D.	13	13.79	21.68
2¼" O. D.	12	15.16	.....
2½" O. D.	12	16.58	26.57
2¾" O. D.	12	17.54	29.00
3" O. D.	12	18.35	31.36
3½" O. D.	11	23.15	39.81
4" O. D.	10	28.66	49.90
5" O. D.	9	44.25	73.93
6" O. D.	7	68.14	.....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1" O. D.	13	$ 7.82	$ 9.01
1¼" O. D.	13	9.26	10.67
1½" O. D.	13	10.23	11.79
1¾" O. D.	13	11.64	13.42
2" O. D.	13	13.04	15.03
2¼" O. D.	13	14.54	16.76
2¼" O. D.	12	16.01	18.45
2½" O. D.	12	17.54	20.21
2¾" O. D.	12	18.59	21.42
3" O. D.	12	19.50	22.48
3½" O. D.	11	24.62	28.37
4" O. D.	10	30.54	35.20
4½" O. D.	10	37.35	43.04
5" O. D.	9	46.87	54.01
6" O. D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm.	$42.00-43.00
4-in., Birmingham	45.00-46.00
4-in., Chicago	53.80-54.80
6-in. & over, Chicago	50.80-51.80
6-in. & over, east fdy.	46.00
Do., 4-in.	49.00

Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Young., Birm., Sparrows Point	$34.00
Duluth (billets)	36.00
Detroit, delivered	36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young., Buffalo, Birm.	40.00
Duluth	42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago	34.00
Detroit, delivered	36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅜-inch incl.	43.00
Do., over ⅜ to 41/64-in. incl.	48.00

Worcester up $2; Galveston up $6; Pacific Coast up $9.

Skelp

Pitts., Chi., Young., Buff., Coatesville, Sparrows Pt.	1.90c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$3.75
Connellsville, fdry.	4.75- 5.50
Connell. prem. fdry.	5.75- 6.25
New River fdry.	6.50- 6.75
Wise county fdry.	5.50- 5.75
Wise county fur.	4.50- 4.75

By-Product Foundry

Newark, N. J., del.	10.88-11.35
Chi., ov., outside del.	9.75
Chicago, del.	10.50
Terre Haute, del.	10.00
Milwaukee, ovens	10.50
New England, del.	12.50
St. Louis, del.	11.00-11.50
Birmingham, ovens	7.00
Indianapolis, del.	10.00
Cincinnati, del.	9.75
Cleveland, del.	10.30
Buffalo, del.	10.50
Detroit, del.	10.25
Philadelphia, del.	10.65

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	16.00c
Toluol, two degree	22.00c
Solvent naphtha	26.00c
Industrial xylol	26.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (200 lb. drums)	16.25c
Do. (450 lbs.)	15.25c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers	5.75c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$28.00

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$22.00	$22.50	$21.50	$23.00
Birdsboro, Pa.	22.00	22.50	21.50	23.00
Birmingham, Ala.‡	17.38	.....	16.38	22.00
Buffalo	21.00	21.50	20.00	22.00
Chicago	21.00	21.00	20.50	21.50
Cleveland	21.00	21.00	20.50	21.50
Detroit	21.00	21.00	20.50	21.50
Duluth	21.50	21.50	.....	22.00
Erie, Pa.	21.00	21.50	20.50	22.00
Everett, Mass.	22.00	22.50	21.50	23.00
Granite City, Ill.	21.00	21.00	20.50	21.50
Hamilton, O.	21.00	21.00	20.50	.....
Neville Island, Pa.	21.00	21.00	20.50	21.50
Provo, Utah	19.00	.....	.....	.....
Sharpsville, Pa.	21.00	21.00	20.50	21.50
Sparrow's Point, Md.	22.00	.....	21.50	.....
Swedeland, Pa.	22.00	22.50	21.50	23.00
Toledo, O.	21.00	21.00	20.50	21.50
Youngstown, O.	21.00	21.00	20.50	21.50

‡Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	22.39	22.39	21.89	22.89
Baltimore from Birmingham	22.78	.....	21.66	.....
Boston from Birmingham	22.12	.....	.....	.....
Boston from Everett, Mass.	22.50	23.00	22.00	23.50
Boston from Buffalo	22.50	23.00	22.00	23.50
Brooklyn, N. Y., from Bethlehem	24.50	25.00	.....	.....
Canton, O., from Cleveland	22.39	22.39	21.89	22.89
Chicago from Birminghom	†21.22	.....	.....	.....
Cincinnati from Hamilton, O.	21.24	22.11	21.61	.....
Cincinnati from Birmingham	21.06	.....	20.06	.....
Cleveland from Birmingham	21.32	.....	20.82	.....
Mansfield, O., from Toledo, O.	22.94	22.94	22.44	22.44
Milwaukee from Chicago	22.10	22.10	21.60	22.60
Muskegon, Mich., from Chicago, Toledo or Detroit	24.19	24.19	23.69	24.69
Newark, N. J., from Birmingham	23.15	.....	.....	.....
Newark, N. J., from Bethlehem	23.53	24.03	.....	.....
Philadelphia from Birmingham	22.46	.....	21.96	.....
Philadelphia from Swedeland, Pa.	22.84	23.34	22.34	.....
Pittsburgh district from Neville Island	Neville base, plus 69c, 84c, and $1.24 freight.			
Saginaw, Mich., from Detroit	23.45	23.45	22.95	22.95

	No. 2 Fdry.	Malleable	Basic	Bessemer
St. Louis, northern	21.50	21.50	21.00	.....
St. Louis from Birmingham	†21.12	.....	20.62	.....
St. Paul from Duluth	23.63	23.63	.....	24.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Standish, N. Y., $26.50, base; $27.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$20.50	Lake Superior fur.	$25.00
Pitts. dist. fur.	20.50	do., del Chicago	28.34
		Lyles, Tenn.	23.50

†Silvery

Jackson county, O., base: 6-6.50 per cent $25.50; 6.51-7—$26.00; 7-7.50—$26.50; 7.51-8—$27.00; 8-8.50—$27.50; 8.51-9—$28.00; 9-9.50—$28.50; Buffalo, $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$60.80

First Quality

Pa., Ill., Md., Mo., Ky.	47.50
Alabama, Georgia	47.50
New Jersey	52.50

Second Quality

Pa., Ill., Ky., Md., Mo.	42.75
Georgia, Alabama	34.20
New Jersey	49.00

Ohio

First quality	39.90
Intermediate	36.10
Second quality	31.35

Malleable Bung Brick

All bases	$56.05

Silica Brick

Pennsylvania	$47.50
Joliet, E. Chicago	55.10
Birmingham, Ala.	47.50

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$28.00
Wire cut	$26.00

Magnesite

Imported dead - burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)	$45.00
Do. domestic	40.00
Do., f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00
Quickset magnesite grains, f.o.b. Chewelah, Wash., net, bulk	22.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$47.00
Chem. bonded chrome	47.00
Magnesite brick	67.00
Chem. bonded magnesite	57.00

Fluorspar, 85-5

Washed gravel, duty paid, tide, net ton	$22.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	17.00-18.00
Do. barge	18.00-19.00
No. 2 lump	18.00-19.00

Ferroalloy Prices

Ferromanganese, 78-82%, tidewater, duty pd. $80.00
Do., del. Pittsburgh 85.33

Spiegeleisen, 19-21% dom. Palmerton, Pa., spot 28.00
Do., 26-28%, Palmerton 33.00

Ferrosilicon, 50% freight allowed, c.l. 69.50
Do., ton lot 80.50
Do., 75 per cent 126.00
Spot, $5 a ton higher.

Silicoman, 2½ carbon 88.00
2% carbon, 93.00; 1%, 103.00
Contract ton price $11 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 1.60-1.65

Ferrovanadium, 35 to 40%, lb., cont. 2.70-2.80-2.90

Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, 58.50; electrolytic, per ton, c. l., 23-26% f.o.b. Monsanto, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 10.50c
Do., ton lots 11.25c
Do., less-ton lots 11.50c

67-72% carloads, 2% carbon, per lb. contained
chrome 16.50c
Do., ton lots 17.25c
Do., less-ton lots 17.75c

	Carloads	Ton lots	Less ton
2% carb.	16.50c	17.25c	17.50c
1% carb.	17.50c	18.25c	18.50c
0.10% carb.	18.50c	19.25c	19.50c
0.20% carb.	19.50c	20.25c	20.50c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Ferrotitanium, 40-45%, lb., con. ti., f.o.b. Niagara Falls, ton lots $1.23
Do., less-ton lots 1.25
20-25% carbon, 0.10 max., ton lots, lb. 1.35
Do, less-ton lots 1.40
Spot 5c higher

Ferrocolumbium, 50-60%, contract, lb. con. col., f.o.b. Niagara Falls $2.25
Do, less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton $142.50
Do, spot 145.00
Do, contract, ton lots 145.00
Do, spot, ton lots 150.00

15-18% ti., 3-5% carbon, carlots, contr., net ton 157.50
Do, spot 160.00
Do, contract, ton lots 160.00
Do, spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do, ton lots 8.00c
Do, less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, any quantity, freight allowed, lb. 7.25c
Do, spot carlots, bulk 7.50c
Do, ton lots 8.00c
Do., less-ton lots 8.25c

Tungsten Metal Powder, according to grade, spot shipment, 200-lb. drum lots, lb. $2.00
Do, smaller lots 2.10

Vanadium Pentoxide, contract, lb. contained $1.10
Do, spot 1.15

Chromium Metal, 98% cr., 0.50 carbon max., contract, lb. con. chrome 80.00c
Do, spot 85.00c

88% chrome, contract 79.00c
Do, spot 84.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ⅛-in., lb. 14.00c
Do, 2% 12.50c
Spot ¼c higher

Silicon Briquets, contract carloads freight allowed, ton $69.50
Carload, spot 74.50
Less-ton lots, lb. 3.75c

Manganese Briquets, contract carloads, bulk freight allowed, lb. 4.50c
Ton lots 5.00c
Less-ton lots 5.25c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, gross ton $97.50
Do, spot 102.50

34-40%, contract, carloads, lb., alloy 14.00c
Do, ton lots 15.00c
Do, less-ton lots 16.00c
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.60
Do, 100-200 lb. lots 2.75
Do, under 100-lb. lots 3.00

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24
Boston	3.88	4.06	5.06	3.85	3.85	5.66	3.71	4.78	4.61
New York (Metropolitan)	3.84	3.96	3.96	3.76	3.75	5.56	3.40	4.60	4.50
Philadelphia	3.60	3.60	4.10	3.40	3.40	5.00	3.40	....	4.43
Baltimore	3.70	3.80	4.80	3.55	3.55	5.00	3.55	4.90	4.30
Norfolk, Va.	3.90	4.00	....	3.75	3.75	5.20	3.75	....	5.40
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.35	4.40	4.40
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	4.45	4.50
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.55	4.62
Detroit	3.33	3.43	3.68	3.60	3.65	5.27	3.43	4.50	4.59
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	....	4.57
Chicago	3.50	3.75	3.75	3.55	3.55	5.15	3.35	4.30	4.25
Minneapolis-St. Paul	3.75	3.85	3.85	3.80	3.80	5.40	3.60	4.95	4.50
Milwaukee	3.73	3.88	3.88	3.68	3.68	5.28	3.63	4.58	4.63
St. Louis	3.62	3.72	3.72	3.47	3.47	5.07	3.38	3.32	4.53
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00
Memphis	3.90	4.00	4.00	3.95	3.95	5.71	3.75	....	5.00
Chattanooga	3.80	3.90	3.90	3.85	3.85	5.80	3.65	....	4.40
Tulsa, Okla.	4.54	4.64	4.64	4.41	4.41	6.01	4.32	....	5.29
Birmingham, Ala.	3.50	3.60	3.60	3.55	3.55	5.88	3.35	....	4.75
New Orleans	3.85	4.65	4.65	3.80	3.80	5.75	4.10	....	4.60
Houston, Tex.	3.50	5.85	6.25	4.05	4.05	5.65	3.95	....	5.25
Seattle	3.65	3.85	5.20	3.40	3.50	5.25	3.70	....	4.75
Portland, Oreg.	4.00	4.40	6.10	4.00	4.00	5.50	3.95	6.50	4.75
Los Angeles	4.00	4.50	6.35	4.00	4.00	6.20	4.20	6.30	4.75
San Francisco	3.50	3.90	6.00	3.45	3.45	5.05	3.45	6.40	5.15

	Cold Rolled Strip	Cold Finished Bars	SAE Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series	SAE Cold Drawn Bars: 2300	3100
Boston	3.46	4.13	4.18	7.50	6.05	5.80	7.90	8.63	7.23
New York	3.51	4.09	4.04	7.35	5.90	5.65	....	8.59	7.19
Philadelphia	3.66	4.06	3.85	7.31	5.86	5.61	8.56	....	....
Baltimore	....	4.05	3.85	....	....	....	....	....	....
Norfolk, Va.	....	4.15	....	....	....	....	....	....	....
Buffalo	3.42	3.75	3.75	7.10	5.65	5.40	8.50	8.15	6.75
Pittsburgh	3.35	3.65	3.80	7.35	5.95	5.70	7.75	8.35	6.95
Cleveland	3.20	3.75	3.30	7.30	5.85	5.85	7.70	8.15	6.75
Detroit	3.40	3.80	3.38	7.42	5.97	5.72	7.19	8.45	7.05
Cincinnati	3.45	4.00	3.65	7.44	5.99	5.74	8.84	8.50	7.10
Chicago	3.65	3.75	3.80	7.25	5.85	5.60	7.65	8.25	6.85
Minneapolis	....	4.34	3.90	7.45	6.00	8.59	9.19	8.84	7.44
Milwaukee	....	3.93	3.93	7.48	6.08	5.83	7.88	8.48	7.08
St. Louis	3.76	4.02	3.92	7.62	6.22	5.97	8.02	8.62	7.22
Kansas City	....	4.30	....	....	....	....	....	....	....
Memphis	....	4.31	....	....	....	....	....	....	....
Chattanooga	....	4.39	....	....	....	....	....	....	....
Tulsa, Okla.	....	4.79	....	....	....	....	....	....	....
Birmingham, Ala.	....	4.43	....	....	....	....	....	....	....
New Orleans	5.00	5.10	....	....	....	....	....	....	....
Seattle	....	5.60	5.65	....	7.80	7.65	8.45	....	....
Portland, Oreg.	....	5.60	6.10	9.00	8.00	7.85	8.70	....	....
Los Angeles	4.45	6.60	4.65	9.40	8.55	8.40	9.05	10.40	9.55
San Francisco	*9.30	6.55	4.50	9.65	8.80	8.65	9.30	10.65	9.80

* Based on minimum quantity.

CURRENT IRON AND STEEL PRICES OF EUROPE

Dollars at Rates of Exchange, June 8

Export Prices f. o. b. Port of Dispatch—

By Cable or Radio

	British gross tons U. K. ports £ s d	Quoted in dollars at current value	Continental Channe or North Sea ports, gross tons **Quoted in gold pounds sterling £ s d
Foundry, 2.50-3.00 Si.	$23.40 5 0 0	$18.32	2 3 0
Basic bessemer	....	17.89	2 2 0
Hematite, Phos. .03-.05	26.91 5 15 0*	.....	.....
Billets	$34.52 7 7 6	$38.34	4 10 0
Wire rods, No. 5 gage	53.24 11 7 6	42.60	5 0 0
Standard rails	$44 46 9 10 0	$48.99	5 15 0
Merchant bars	2.30c 11 0 0	1.95c to 1.98c	5 2 6 to 5 4 0
Structural shapes	2.09c 10 0 0	1.76c to 1.85c	4 12 6 to 4 17 6
Plates, †¼ in. or 5 mm.	2.29c 10 18 9	2.14c to 2.33c	5 12 6 to 6 2 6
Sheets, black, 24 gage or 0.5 mm.	2.72c 13 0 0	2.95c	7 15 0*
Sheets, gal., 24 ga., corr.	3.29c 15 15 0	3.52c	9 5 0
Bands and strips	2.77c 13 5 0	1.95c to 2.00c	5 2 6 to 5 5 0
Plain wire, base	4.08c 19 10 0	2.33c to 2.76c	6 2 6 to 7 5 0
Galvanized wire, base	4.86c 23 5 0	2.99c to 3.09c	7 17 6 to 8 2 6
Wire nails, base	....	2.66c to 2.85c	7 0 0 to 7 10 0
Tin plate, box 108 lbs.	$ 4.74 1 0 3	....	.....

British ferromanganese $80.00 delivered Atlantic seaboard duty-paid.

Domestic Prices at Works or Furnace—

Last Reported

	£ s d		French Francs		Belgian Francs		Reich Mark
Fdy. pig iron, Si. 2.5	$23.17	4 19 0(a)	$16.61	626.75	$17.05	500	$25.27	63
Basic bess. pig iron	21.65	4 12 6(a)	.....	....	.....	...	27.88 (b)	69.50
Furnace coke	5.38	1 4 2	5.96	225	6.89	202	7.62	19
Billets	34.52	7 7 6	25.04	945	29.32	860	38.71	96.50
Standard rails	1.99c	9 10 0	1.56c	1,300	2.06c	1,375	2.38c	132
Merchant bars	2.42c	11 12 0††	1.44c	1,202	1.65c	1,100	1.98c	110
Structural shapes	2.17c	10 8 0††	1.41c	1,173	1.65c	1,100	1.93c	107
Plates, †¼-in. or 5 mm.	2.29c	10 19 3††	1.82c	1,515	2.06c	1,375	2.29c	127
Sheets, black	3.08c	14 15 0§	2.17c	1,805‡	2.36c	1,575‡	2.59c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	3.61c	17 5 0	3.30c	2,750	4.13c	2,750	6.66c	370
Plain wire	4.08c	19 10 0	1.74c	1,450	2.48c	1,650	3.11c	173
Bands and strips	2.58c	12 7 0††	1.61c	1,340	1.95c	1,300	2.29c	127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel. (a) del. Middlesbrough. 5s rebate to approved customers. (b) hematite. °Close annealed. ††Rebate of 15s on certain conditions.

**Gold pound sterling carries a premium of 75 per cent over paper sterling.

IRON AND STEEL SCRAP PRICES

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated; † indicates brokers prices

HEAVY MELTING STEEL

Birmingham, No. 1	†12.00
Bos. dock No. 1 exp.	13.75-14.00
New Eng. del. No. 1	14.00
Buffalo, No. 1, R. R.	13.50-14.00
Buffalo, No. 1	13.00-13.50
Buffalo, No. 2	11.00-11.50
Chicago, No. 1	13.50-14.00
Chicago, auto, no alloy	12.25-12.75
Chicago, No. 2 auto	10.50-11.00
Cincinnati, dealers	10.50-11.00
Cleveland, No. 1	13.75-14.25
Cleveland, No. 2	12.50-13.00
Detroit, No. 1	9.00- 9.50
Detroit, No. 2	8.50- 9.00
Eastern Pa., No. 1	15.50
Eastern Pa., No. 2	13.00-13.50
Federal, Ill.	11.25-11.75
Granite City, R. R.	11.25-11.75
Granite City, No. 2	10.50-11.00
Los Angeles, No. 1	13.00-14.00
Los Angeles, No. 2	12.00-13.00
N. Y. dock No. 1 exp.	12.00-12.50
Pitts., No. 1 (R. R.)	16.00-16.50
Pittsburgh, No. 1	15.00-15.50
Pittsburgh, No. 2	14.00-14.50
St. Louis, R. R.	11.75-12.25
St. Louis, No. 2	10.50-11.00
San Francisco, No. 1	13.00-13.50
Seattle, No. 1	11.00-12.00
Toronto, dlrs. No. 1	9.25- 9.75
Valleys, No. 1	14.50-15.00

COMPRESSED SHEETS

Buffalo	11.00-11.50
Chicago, factory	12.75-13.25
Chicago, dealers	11.75-12.25
Cincinnati dealers	10.00-10.50
Cleveland	13.75-14.25
Detroit	10.25-10.75
E. Pa., new mat.	15.50
E. Pa., old mat.	11.50-12.00
Los Angeles	14.00-14.50
Pittsburgh	15.00-15.50
St. Louis	9.50-10.00
Valleys	14.00-14.50

BUNDLED SHEETS

Buffalo, No. 1	11.00-11.50
Buffalo, No. 2	10.00-10.50
Cleveland	9.50-10.00
Los Angeles	14.00
Pittsburgh	14.00-14.50
St. Louis	7.00- 7.50
Toronto, dealers	8.00- 8.50

SHEET CLIPPINGS, LOOSE

Chicago	8.00- 8.50
Cincinnati, dealers	6.00- 6.50
Detroit	7.00- 7.50
†Los Angeles	3.75- 4.00
St. Louis	6.00- 6.50
Toronto, dealers	4.25- 4.75

BUSHELING

Buffalo, No. 1	11.00-11.50
Chicago, No. 1	12.50-13.00
Cincin., No. 1, deal.	7.00- 7.50
Cincinnati, No. 2	1.75- 2.25
Cleveland, No. 2	7.50- 8.00
Detroit, No. 1, new	9.50-10.00
Valleys, new, No. 1	13.50-14.00
Toronto, dealers	3.75- 4.25

MACHINE TURNINGS (Long)

Birmingham	†4.50- 5.00
Buffalo	6.00- 6.50
Chicago	7.00- 7.50
Cincinnati, dealers	4.00- 4.50
Cleveland	7.00- 7.50
Detroit	4.25- 4.75
Eastern Pa.	8.50
Los Angeles	4.50- 5.00
New York	†3.50- 4.00
Pittsburgh	8.00- 8.50
St. Louis	3.50- 4.00
Toronto, dealers	4.25- 4.75
Valleys	9.00- 9.50

SHOVELING TURNINGS

Buffalo	7.25- 7.75
Cleveland	7.50- 8.00
Chicago	7.00- 7.50
Chicago, spcl. anal.	8.00- 8.50
Detroit	5.25- 5.75
Pitts., alloy-free	9.50-10.00

BORINGS AND TURNINGS

For Blast Furnace Use

Boston district	2.00
Buffalo	6.75- 7.25
Cincinnati, dealers	2.75- 3.25
Cleveland	7.50- 8.00
Eastern Pa.	6.50- 7.00
Detroit	4.75- 5.25
New York	†2.50- 3.00
Pittsburgh	7.50- 8.00
Toronto, dealers	3.50- 4.00

AXLE TURNINGS

Boston district	†7.50
Buffalo	9.50-10.00
Chicago, elec. fur.	14.00-14.50
East. Pa., elec. fur.	13.00-13.50
St. Louis	9.00- 9.50
Toronto	4.00- 4.25

CAST IRON BORINGS

Birmingham	†6.00- 6.50
Boston dist. chem.	†4.50
Buffalo	6.75- 7.25
Chicago	6.50- 7.00
Cincinnati, dealers	2.75- 3.25
Cleveland	7.50- 8.00
Detroit	4.75- 5.25
E. Pa., chemical	10.00-11.00
New York	†3.50- 4.00
St. Louis	2.50- 3.00
Toronto, dealers	3.75- 4.25

RAILROAD SPECIALTIES

Chicago	15.25-15.75

ANGLE BARS—STEEL

Chicago	15.25-15.75
St. Louis	13.00-13.50

SPRINGS

Buffalo	15.50-16.00
Chicago, coil	16.50-17.00
Chicago, leaf	15.00-15.50
Eastern Pa.	17.00-17.50
Pittsburgh	18.00-18.50
St. Louis	14.00-14.50

STEEL RAILS, SHORT

Birmingham	†12.00-12.50
Buffalo	16.50-17.00
Chicago (3 ft.)	16.00-16.50
Chicago (2 ft.)	16.50-17.00
Cincinnati, dealers	16.25-16.75
Detroit	16.00-16.50
Los Angeles	15.00-15.50
Pitts., 3 ft. and less	18.50-19.00
St. Louis, 2 ft. & less	16.25-16.75

STEEL RAILS, SCRAP

Boston district	†13.50-14.00
Buffalo	15.50-16.00
Chicago	13.50-14.00
Cleveland	16.00-16.50
Pittsburgh	16.00-16.50
St. Louis	13.00-13.50
Seattle	16.00

FROGS, SWITCHES

Chicago	13.50-14.00
St. Louis, cut	13.00-13.50

ARCH BARS, TRANSOMS

St. Louis	13.50-14.00

PIPE AND FLUES

Chicago, net	8.50- 9.00
Cincinnati, dealers	6.00- 6.50

RAILROAD GRATE BARS

Buffalo	9.00- 9.50
Chicago, net	7.50- 8.00
Cincinnati, dealers	5.75- 6.25
Eastern Pa.	12.50-13.00
New York	†8.50- 9.00
St. Louis	8.00- 8.50

RAILROAD WROUGHT

Birmingham	†11.00-11.50
Boston district	†9.50-10.00
Eastern Pa., No. 1	16.00-16.50
St. Louis, No. 1	9.75-10.25
St. Louis, No. 2	11.50-12.00

FORGE FLASHINGS

Boston district	†7.50
Buffalo	11.00-11.50
Cleveland	11.00-11.50
Detroit	8.50- 9.00
Los Angeles	9.00
Pittsburgh	13.50-14.00

FORGE SCRAP

Boston district	†6.50
Chicago, heavy	15.50-16.00

LOW PHOSPHORUS

Cleveland, crops	17.50-18.00
Eastern Pa., crops	17.00-17.50
Pitts., billet, bloom, slab crops	19.00-19.50

LOW PHOS. PUNCHINGS

Buffalo	15.50-16.00
Chicago	15.50-16.00
Eastern Pa., crops	17.50-18.00
Pittsburgh	17.50-18.00
Seattle	15.00

RAILS FOR ROLLING

5 feet and over

Birmingham	†14.00-15.00
Boston	15.00-15.50
Chicago	17.50-18.00
New York	†14.00-14.50
Eastern Pa.	17.00-17.50
St. Louis	16.00-16.50

STEEL CAR AXLES

Birmingham	†15.00-16.00
Boston district	†14.50
Chicago, net	17.50-18.00
Eastern Pa.	20.50-21.00
St. Louis	17.00-17.50

LOCOMOTIVE TIRES

Chicago (cut)	15.50-16.00
St. Louis, No. 1	12.25-12.75

SHAFTING

Boston district	†15.25-15.50
New York	†15.50-16.00
Eastern Pa.	20.50-21.00
St. Louis, 1¼-3¾"	15.50-16.00

CAR WHEELS

Birmingham	†13.50-14.00
Boston dist., iron	†10.00
Buffalo, steel	16.00-16.50
Chicago, iron	13.50-14.00
Chicago, rolled steel	14.50-15.00
Cincin., iron, deal.	12.00-12.50
Eastern Pa., iron	15.50-16.00
Eastern Pa., steel	17.00-17.50
Pittsburgh, iron	14.50-15.00
Pittsburgh, steel	18.00-18.50
St. Louis, iron	14.00-14.50
St. Louis, iron	14.00-14.50

NO. 1 CAST SCRAP

Birmingham	†13.00-13.50
Boston, No. 1 mach.	†11.00-11.50
N. Eng. del. No. 2	12.00-12.50
N. Eng. del. textile	12.50-13.00
Buffalo, cupola	13.00-13.50
Buffalo, mach.	14.00-14.50
Chicago, agri. net	9.50-10.00
Chicago, auto net	12.50-13.00
Chicago, railroad net	11.00-11.50
Chicago, mach. net	12.00-12.50
Cincin., mach. deal.	11.50-12.00
Cleveland, mach.	16.50-17.00
Detroit, cupola, net	12.50-13.00
Eastern Pa., cupola	16.00-16.50
E. Pa., mixed yard	13.50-14.00
Los Angeles, net	13.50-14.00
Pittsburgh, cupola	15.00-15.50
San Francisco, del.	13.50-14.00
Seattle	12.00-14.50
St. Louis, cupola	12.00-12.50
St. Louis, agri. mach.	14.00-14.50
St. L., No. 1 mach.	14.50-15.00
Toronto, No. 1, mach., net	12.00-12.50

HEAVY CAST

Boston dist. break.	†9.50
New England, del.	12.50-13.00
Buffalo, break.	11.00-11.50
Cleveland, break, net	12.50-13.00
Detroit, auto net	12.50-13.00
Detroit, break	9.50-10.00
Eastern Pa.	14.75
Los Ang., auto, net	13.50
New York, break.	†10.50-11.00
Pittsburgh, break.	12.50-13.00

STOVE PLATE

Birmingham	†7.50- 8.00
Boston district	†8.00- 8.25
Buffalo	11.50-12.00
Chicago, net	7.75-8.25
Cincinnati, dealers	5.75- 6.25
Detroit, net	7.00- 7.50
Eastern Pa.	12.50-13.00
New York, fdy.	†10.00-10.50
St. Louis	7.50- 8.00
Toronto dealers, net	8.00- 8.50

MALLEABLE

Birmingham, R. R.	†10.50-11.00
New England, del.	11.50-12.50
Buffalo	13.50-14.00
Chicago, R. R.	15.00-15.50
Cincin., agri., deal.	10.25-10.75
Cleveland, rail	15.00-15.50
Eastern Pa., R. R.	15.00-16.50
Los Angeles	17.50-18.00
Pittsburgh, rail	15.00-15.50
St. Louis, R. R.	12.25-12.75

Iron Ore

Lake Superior Ore

Gross ton, 51½%

Lower Lake Ports

Old range bessemer	$5.25
Mesabi nonbessemer	4.95
High phosphorus	4.85
Mesabi bessemer	5.10
Old range nonbessemer	5.10

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56.63% con.	9.00-9.25
Cop.-free low phos. 58-60%	nominal

Foreign Ore

Cents per unit, c.i.f. Atlantic

Foreign manganiferous ore, 45.55% iron, 6-10% man. nom.	12.00
No. Afr. low phos.	12.00
Swedish low phos.	12.00
Spanish No. Africa basic, 50 to 60% nom.	10.00-10.50
Tungsten. sh. ton unit, duty pd. nom.	19.00-19.50
N. F., fdy., 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	$23.00-24.00
Molybdenum ores sulphide, per lb. molybdenum contained, f.o.b. mill	0.75

Manganese Ore

Prices not including duty, cents per unit cargo lots.

Caucasian, 50-52% nom.	29.00
So. African, 50-52% nom.	29.00
Indian, 49-50%	27.00-28.00

Sheets, Strip

Sheet and Strip Prices, Pages 84, 85

Pittsburgh — Automotive releases and an increase in miscellaneous demand have started a definite upward movement in sheet and strip operations. Sheet mill schedules are near 55 per cent, best rate in more than two months, with further gains looked for with the start of new model automobile production. Strip operations also are higher at about 35 per cent, but galvanized sheet production is down seasonally to 51 per cent. The price situation is quiet.

Cleveland — Releases against recent flat-rolled steel orders are increasing, in some instances being heavier than expected. Automotive tonnage is an exception, since new model requirements will continue light for a number of weeks. New sheet business is slow. Sharp price concessions still appear occasionally in galvanized sheets, but some producers refuse to meet such quotations.

Chicago—New business in flat-rolled steel is light, generally being quieter than before the price-cutting period. Production is increasing but releases from recent heavy buyers are slow. About 3000 tons of sheets were reported involved in a recent order from the Milwaukee railroad for freight car building.

New York — Sheet specifications are relatively active despite a moderate seasonal letdown in consumption by some users. With buyers generally well covered into third quarter, sellers have little opportunity to work off current backlogs this month. Warehouses in particular are protected on galvanized as well as hot and cold rolled sheet needs next quarter.

Sheet prices are still soft in spots, not all producers having completely withdrawn concessions of last month. However, as consumers generally covered substantially in May at the time of the original price outbreak, current concessions are bringing out little new tonnage.

Buffalo—Sheet and strip production is moderately heavier as producers are attempting to clear books of low-price orders taken recently. Miscellaneous consumers account for most tonnage, with only small lots being shipped to the automotive industry.

Philadelphia—Despite heavy coverage recently, much sheet inquiry has appeared for carlots and more. Most of this has been booked on the basis of 2.00c, Sparrows Point. Shipping instructions on low-priced tonnage have been received on well over half so far. It is conceded, however, that large consumers are well covered through fourth quarter. Reported inquiry of the Florida East Coast railroad for two seven-car diesel-electric trains may result in a large inquiry for stainless strip from a local interest.

Cincinnati—Sheet deliveries are better than 50 per cent of rolling capacity. Despite heavy buying recently at price concessions new business has declined less than anticipated. Automotive specifications are considered in normal proportion to total tonnage.

St. Louis—Specifications continue to expand moderately. More interest is being shown in galvanized sheets, particularly heavier grades. Enameling stock, less active than a month ago, is expected to quicken soon.

Birmingham, Ala.—Sheet bookings, especially roofing, are up slightly over last week. Output is estimated at better than 60 per cent. Some strip also is being turned out.

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● Electro coated Thomastrip is cutting costs for many manufacturers. Through our special rolling and plating processes Nickel, Brass, Copper and other electro coatings *can be supplied economically* and will not crack or peel during forming operations. The exceptional quality of the coatings frequently eliminates further finishing operations.

Thomas processes achieve quality coatings for many requirements and solve the problem of finish by obtaining the desired quality at the least cost. Let us discuss your requirements and see if we have a definite economy to offer you.

THE THOMAS STEEL COMPANY · Warren, Ohio
SPECIALIZED PRODUCERS OF COLD ROLLED STRIP STEEL

Plates

Plate Prices, Page 84

New York—Current and prospective plate business is heavier. Oil company work involves 2800 tons for ten tanks to be built at Bayonne, N. J., for Asiatic Petroleum Corp. and heat exchangers and pressure stills for Standard of New Jersey. A large plate tonnage is involved in 40,000 tons of steel for 24 naval vessels placed recently and in 30,000 tons required for 12 merchant ships to be bid July 11. Outstanding in freight car material are requirements for a maximum of 1110 cars for the Western Maryland, bids June 22.

Concessions on plates of $2 a ton are available, with the delivered market here again holding at 2.19c to 2.29c. Even sharper cuts have been reported recently, but only in scattered instances.

Philadelphia — Prices are fairly steady, with most tonnage being placed at 2.10c, Claymont, Del. Concessions are the exception. Placing of about 500 tons each by the Reading and Pennsylvania railroads will provide an adequate test of the market. The Pennsylvania plates will go into 25 tenders. The 1110 cars, for which the Western Maryland is inquiring, will require about 4000 tons of plates, part of which is expected to be placed in this district. The cars also will take about 3800 tons of sheets and strip, 4400 tons of shapes and 500 tons of bars.

Birmingham, Ala.—Plate bookings have shown some increase during the past 10 days. Production is at approximately 60 per cent.

San Francisco—Slight improvement in demand for plates is noted, though most inquiries are for small lots. Thompson Manufacturing Co., booked 228 tons for penstocks for the Elephant Butte power plant on the Rio Grande project in New Mexico and 100 tons for outlet pipes for the Fresno dam, Milk River project, Mont. Awards totaled 594 tons, bringing the year's aggregate to 17,249 tons, compared with 14,171 tons for the same period a year ago.

Seattle — Inquiry is more active, jobs involving less than 100 tons predominating. Bids go to reclamation bureau, Bend, Oreg., June 27, involving placing of conduit lining and 105 tons 96-inch outlet pipes for Wickiup dam. Thompson Mfg. Co., Denver, has been awarded outlet pipes for the Fresno dam, Milk river project., Mont., 100 tons or more.

Plate Contracts Placed

2790 tons, 10 tanks, Asiatic Petroleum Corp., Bayonne, N. J., to Hammond Iron Works, Warren, Pa.

228 tons, penstock, Elephant Butte power plant, Rio Grande project, N. Mex., specification 1217-D, to Thompson Mfg. Co., Denver.

200 tons, tunnel liners, United States engineer office, Los Angeles, proposal 209, to Youngstown Steel Car Corp., Youngstown, O.

100 tons or more, Fresno dam, Mont., to Thompson Mfg. Co., Denver.

Plate Contracts Pending

135 tons, 300,000-gallon elevated tank, McChord Field, Wash.; Chicago Bridge & Iron Co., Chicago, low.

Unstated tonnage, three oil storage tanks for Big West Oil Co., Spokane; Whitehouse & Price, Spokane, engineers.

Tin Plate

Tin Plate Prices, Page 84

Tin plate specifications appear to be nearing their peak for this year. Production, holding at 70 per cent, also is thought likely to have reached its maximum, although

BRASSERT

PLATE TYPE GAS VALVE

fulfills all these ten commandments

1. The valve should operate in a straight line rather than as a goggle.
2. The valve structure should have sufficient beam strength to require no support from the ground.
3. The valve must be self-contained in that it must embody an expansion joint, the retracting mechanism being completely independent of the structure of the valve body. Movement of the clamping flange must be positive in both directions.
4. The valve opening must be equal to the diameter of the pipe, and must be free from obstruction to the flow of gas.
5. The valve plate must be sufficiently stiff to avoid accidental distortion, and to maintain a tight joint. It must be capable of positive mechanical movement in both directions. It should be capable of full counterweighting when operating vertically.
6. The valve must be capable of location and operation in any position, vertical, horizontal or inclined. For this reason the valve plate should be positively moved away from engagement with its seat at the beginning of motion, and should be returned to contact at the end of motion.
7. The construction must be adapted to the use of either hot or cold gas.
8. The operating mechanism of the valve should be on the outside, and capable of examination. The mechanism should be capable of lubrication, and should be dirtproof.
9. The contacting surfaces should be of non-corrosive material.
10. The valve should be capable of rapid manual operation without undue exertion by the operator.

For further particulars, address us at Chicago or Pittsburgh.

H. A. BRASSERT and COMPANY

310 South Michigan Avenue
CHICAGO, ILLINOIS

436 Seventh Avenue
PITTSBURGH, PENNA.

July schedules are expected to be good. Outlook for canning operations is favorable despite the amount of canned goods carried over from last year. Heavy food crops generally are looked for.

Bars

Bar Prices, Page 84

Cleveland—Diversified sources are represented in recent moderate improvement in bar demand. Some automotive tonnage is included but only a small portion is for new models. June 30 is set as the deadline for application of quantity deductions on orders of 75 tons and over. Meanwhile the lower base price of 2.15c is named on smaller lots.

Chicago — Carbon and alloy bar business has dropped off somewhat here because of light automotive demand and decreasing requirements of the farm equipment industry. A broad range of miscellaneous interests, however, continue to support the market, and no protracted downtrend in general demand is indicated. Prices generally are fair, with demand for some items not sufficiently heavy to provide a test.

Boston—Demand for alloy bars is steady but light and generally is through secondary sellers. A slight improvement in forging bar business is noted from small tool and automotive parts interests. Prices appear steady. Shipyard releases are holding, with specifications for alloy bars tending upward.

New York—Buying continues limited, with jobber specifications light and little tonnage coming from railroads. Machine tool demand is off slightly but still fair. Automotive accessory companies are existing largely on stocks. Brisk specifications for special alloys continue from government shops and aircraft builders. Bar sellers state they will adhere to the June 30 deadline on shipments to large buyers which earn quantity differentials and a $1 advantage over the flat price henceforth to be applied to all orders of 3 tons and over.

Philadelphia — Miscellaneous bar demand is little more than steady. Warehouses are contributing only odd lots. Cold finished bars are moving fairly well, especially to makers of heavy equipment. Prices are firm with no test of consequence reported on quantity lots for third quarter. Quantity buyers face a $1 advance for that period.

Buffalo — Bar mill schedules are steady. Automotive orders are lighter but production is supported by expansion in shape and reinforcing bar specifications. Substantial releases for new automobile models are not expected for several weeks.

Birmingham, Ala.—A scattering of concrete reinforcing bars is coming out but expected business from implement manufacturers has not developed.

Wire

Wire Prices, Page 85

Pittsburgh—Business in merchant products is light and generally unchanged. Prices usually are steady. Many distributors are well covered and are inactive in buying. Manufacturers' wire specifications are light. Automotive buying is expected to continue slow during June. Miscellaneous demand is good, ordering of small lots being fairly frequent.

Cleveland — Business is well sustained, making a favorable comparison with May so far this month. As during the past several months variations in production also are slight. Automotive needs still are depressed but shortly will be stimu-

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SUPER-HEAVY-DUTY
ROLLER BEARINGS

In every industry, including your own, there are some super-operations that involve unusually severe loads and strains. The machinery used must be "super" too — including the bearings that carry the load. American Super-Heavy-Duty Roller Bearings are *right* for such installations. They're not only Super *Heavy-Duty* Bearings — they're *super bearings* in every other way, too. American Roller Bearing Company, Pittsburgh, Pa. *Pacific Coast Office:* 321 West Pico St., Los Angeles.

AMERICAN
Heavy-Duty ROLLER BEARINGS

Behind the Scenes with STEEL

Rue de la Penton

■ We really do have quite a nice place here in Cleveland but apparently some one down in Philadelphia has built us up a little too high. Came a letter last week to STEEL, Penton *Boulevard*, Cleveland.

Birds, Work and Worms

■ For pointing a good old-fashioned moral we liked this recent editorial by Arthur W. Wolf of *Motortrade*.

Ever watch a Robin, in the Spring, get a Square Meal? Does he group off with the other Robins and start talking Hard Times? Does he sit down on his tail-feathers and wait for Manna to fall from Heaven? Does he loaf under a bush and say: "There ain't no worms?" Does he worry about conditions in Europe, or what the other Robins are doing? If he does—he is different from most Robins. Those we know, HUSTLE LIKE HELL. They flop down into a yard, put their ears to the ground and listen to Worm Conversations. When Mr. Worm remarks that he will go up for air, Mr. Robin meets him at the front door, grabs Mr. Worm by the collar and starts pulling. Intent on a meal, Mr. Robin usually wins, even though he gets wet with honest Robin sweat. He stays on the job until he is all wormed up. No stopping to gloat over a single victory. He is either so Dumb he has not heard of Social Security, or so Intelligent that he knows Well Planned Hard Work gets the worms,—or bacon. Have you ever seen a Robin that Starved? I haven't.

More On Birds

■ And speaking of Robins, the other day we learned about one of our readers who is a firm believer in the early bird maxim. In fact, he believes this so ardently that he makes it a point to have a box in his local post-office so he can drop in Sunday after Church and pick up his copy of STEEL for the coming week. Says he: "I don't believe I could spend my Sunday afternoons more profitably, because on Monday morning I am fully informed on what is going on in the industry, before the day's work begins."

Paging Jesse Owens

■ As reported in STEEL last week, the triple mill supply convention held this year aboard the *Monarch of Bermuda* was quite the nertz and marked a new high in convention locale. Momentarily taken in by the idea of a "Running Breakfast" the morning they docked at Bermuda it is unofficially reported that STEEL's eastern manager E. W. Kreutzberg and managing editor A. J. Hain showed up in track shoes and shorts, but otherwise it is understood their conduct was above reproach.

Get Yours Now

■ Senator Tyding's address before the American Iron and Steel institute was plenty good to put it mildly. Complete 8-page reprints are still available. Single copies 10c, 100-500, 5c each, over 500, 4c.

Don't Miss It

■ This week, beginning on page 23. you will find a study and analysis of the steel industry made by STEEL's Pittsburgh editor after a thorough-going check-up of the present thinking of leading technicians and executives. It is "must" reading and we suggest you hike right back to the front of the book now and spend the next fifteen minutets learning some things that may influence the future of your business no little amount.

SHRDLU

lated by new model preparations.

Chicago — Demand for wire and wire products is fairly close to the rate a month ago. Some reduction in June business is looked for as a result of lighter requirements of the automotive and farm equipment industries. Merchant products are moving steadily. Wire mesh is active as a result of a good volume of road building.

New York—Demand for wire, still well diversified, is limited mostly to small orders for prompt delivery. Mills lack backlogs and daily operations are closely linked to current orders. Rod buying is slow, numerous consumers covering moderately about a month back. Wire nail prices are steadier than usual.

Birmingham, Ala.—Although holding, by virtue of relatively small orders, at approximately the pace of the past few weeks, wire has slackened somewhat from its earlier peak. Most tonnage is going direct to consumers.

Pipe

Pipe Prices, Page 85

Pittsburgh—Pipe is slightly more active. The gain is mostly in merchant pipe, the result of building work. Oil country demand continues slow, with drilling at a minimum. Steady production of pipe is in prospect well into the summer.

Cleveland—Pipe business is slightly heavier than a month ago. Standard pipe is aided by sustained demand for building construction and makes relatively the best showing. Oil well casing still is retarded by quiet in drilling operations, but line pipe has been moderately active. Only small lots for gathering lines now are pending, following the award of 7000 tons for a line in Illinois.

Boston—Cast pipe buying and releases are well maintained. The district foundry continues operating nearly full. Steel pipe demand is fairly active for heating and plumbing work, but no large projects are up. Wrought pipe is slow. A gain in demand for corrugated galvanized metal pipe for highway work is noted.

New York — Texas Corp. has closed on 7000 tons of 10-inch pipe for a line in Illinois, the tonnage reported going to an Ohio producer. Several hundred tons of heating pipe has been placed by David J. Rice, contractor, for the Hunter college building and several public schools here, and similar material for the Mineola, Long Island, courthouse also has been ordered.

Birmingham, Ala.—Pipe produc-

tion is holding well although there have been no large single bookings.

San Francisco—Cast iron pipe lettings were the third largest for any week this year, 2117 tons, bringing the total to date to 13,471 tons, compared with 13,996 tons for the corresponding period in 1938. National Cast Iron Pipe Co. took 390 tons of 2 to 10-inch pipe for South Pasadena, Calif. and United States Pipe & Foundry Co. 200 tons of 4 to 10-inch for Burbank, Calif.

Seattle — Port Angeles, Wash., has awarded 350 tons universal cast iron to Marckmann & Williams Inc., representing Central Foundry Co., Birmingham, Ala. Same agency also booked 100 tons for a local industrial plant. The Bethel district project, Eugene, Oreg., 325 tons, has been indefinitely postponed. Bonneville authority opened bids June 7 for 2000 feet black steel pipe.

Cast Pipe Placed

390 tons, 2 to 10-inch, South Pasadena, Calif., to National Cast Iron Pipe Co., Birmingham, Ala.

350 tons, universal cast iron for Port Angeles, Wash., to Marckmann & Williams Inc., Seattle, for Central Foundry Co., Birmingham, Ala.

200 tons, 4 to 10-inch, Burbank, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

100 tons, universal, for private industrial plant, Seattle, to Central Foundry Co., Birmingham, Ala.

Steel Pipe Placed

7000 tons, 10-inch, Texas Corp., for 130-mile line terminating at East Odin, Ill., to Youngstown Sheet & Tube Co., Youngstown, O.

Cast Pipe Pending

1750 tons, 4 to 20-inch, east bay municipal utility district, Oakland, Calif.; United States Pipe & Foundry Co., low on 1500 tons, and American Cast Iron Pipe Co., low on 250 tons.

395 tons, including miscellaneous castings, contract S-3, State street subway, Chicago; bids June 29.

375 tons, 6 and 8-inch, Inglewood, Calif.; bids opened.

220 tons, Portland, Oreg.; bids opened.

Rails, Cars

Track Material Prices, Page 85

Decision of the Chicago, Milwaukee, St. Paul & Pacific to build 1000 box cars in its own shops has brought out 8500 tons of steel, of which 3000 tons are sheets. This has been distributed to several mills.

The Pennsylvania will build 25 locomotive tenders in its own shops. Lehigh & New England has placed fifty 70-ton bulk cement cars. Reading Co. and Central of New Jersey have ordered 2000 tons of rails from Bethlehem Steel Co. Rail awards so far this year total about 500,000 tons, compared with 180,000 tons in the same period last year.

Domestic freight car awards in May involve 2051 units, compared with 3059 in April, bringing the five-month total to 8208. Comparisons follow:

	1939	1938	1937	1936
Jan.	3	25	17,806	2,050
Feb.	2,259	109	4,972	6,900
March	800	680	8,155	632
April	3,095	15	9,772	4,427
May	2,051	6,014	4,732	8,900
5 mos.	8,208	6,843	45,437	22,909
June	.....	1,178	548	5,200
July	.....	0	1,080	7,229
Aug.	.....	182	1,475	225
Sept.	.....	1,750	1,216	1,750
Oct.	.....	2,537	1,355	2,210
Nov.	.....	1,232	275	1,550
Dec.	.....	2,581	275	23,450
Total	.....	16,303	51,611	64,523

During first four months of 1939 class I railroads added 6817 new freight cars, compared with 5302 in the corresponding period last year, according to the Association of American Railroads. New cars added in April numbered 1713.

Car Orders Placed

Chicago, Milwaukee, St. Paul & Pacific, 1000 box cars, 75 cabooses, to own shops.

Lehigh & New England, fifty 70-ton bulk cement cars, to American Car & Foundry Co., New York.

Locomotives Placed

Pennsylvania, 25 locomotive tenders, to own shops.

Rail Orders Placed

Reading Co. & Central Railroad of New Jersey, 2000 tons, to Bethlehem Steel Co., Bethlehem, Pa.

BECAUSE: Hi-Tensile "F" is a fast-running rod. It is quiet and smooth—and has good penetration. Welders find it equally useful on horizontal, vertical and overhead jobs. It is very handy for work in close quarters. Slag and spatter losses are very low.

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Shapes

Structural Shape Prices, Page 84

New York—With construction of the piers being underway, inquiry is expected soon on the superstructures, Raritan river bridge, Sayreville, N. J., and the Passaic river span, Neark-Kearney, N. J. Active bridge requirements are heavier, including 1315 tons for New Jersey, part of which has been bid, and 1045 tons, New York state, closing June 21. Awards are down slightly.

Pittsburgh—No new jobs of large size have been announced recently, although placements are more active with several large jobs awarded. A good many of the new placements are of a private nature, but the total tonnage is predominately public works. New inquiries involving more than 100 tons each also show a number of private jobs getting under way.

Cleveland — Private inquiries remain at disappointing low levels. Public work continues to lead, and still further improvement is anticipated through the next 30 days. Interest centers in state bridge jobs and school projects.

Chicago—Inquiry is aided by section S-3 of the Chicago subway, involving between 1900 and 2000 tons of structural steel and between 6000 and 8000 tons of beam ribs and liner plates, bid June 29. Fabricators report a quiet market, but producing interests state business is well maintained recently.

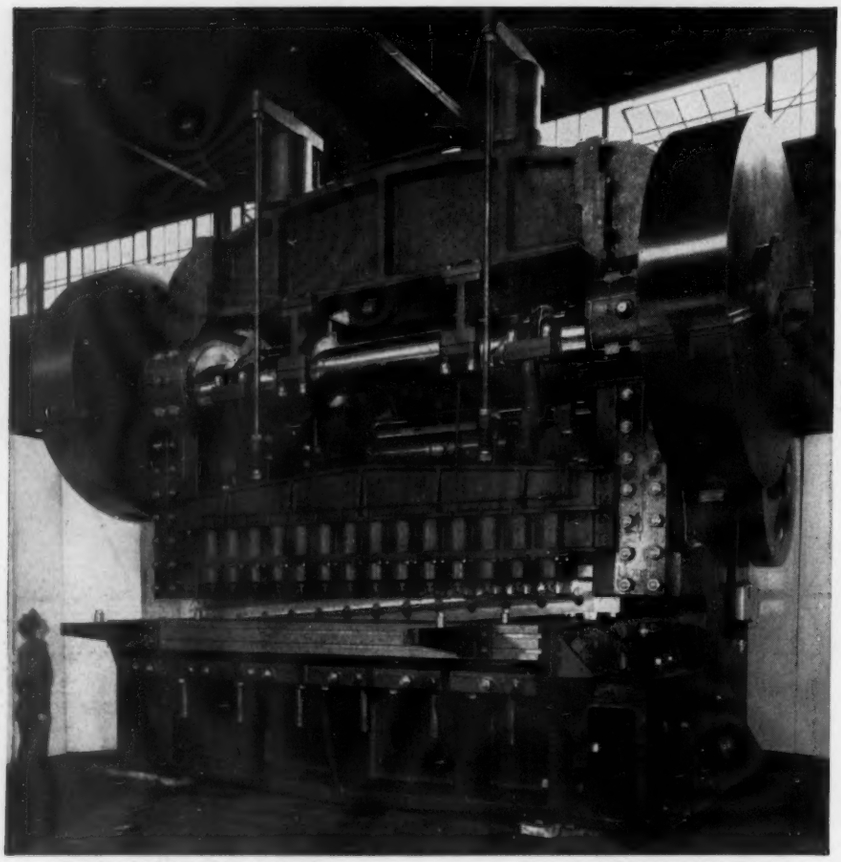
Boston—The Connecticut legislature has approved measures for the construction of new bridges, involving about 1200 tons each, over the Connecticut river, Hartford, and the Thames, New London, the former likely to come up for bids first. Awards are up slightly, including 885 tons for small bridges.

Philadelphia — Hughes Foulkrod Co., Philadelphia, has the general contract for a warehouse for the Armstrong Cork Co., Lancaster, Pa., requiring 750 tons. This award heads the list of a dozen or more jobs, private and public, now pending. Keen competition continues for work available and prices are erratic.

Buffalo—Activity shows signs of improving with the appearance of new jobs for bids. Major interest in the approaching weeks will be centered on a few moderate size state bridge contracts. Three bridges are up for bids June 21, totaling 1050 tons.

San Francisco—Activity is more pronounced in the structural market with 4737 tons placed, bringing total to date to 64,657 tons, compared with 47,800 tons in 1938. Columbia Steel Co. secured 2000 tons for the main cableway tower for the Shasta dam in California and 1700 tons of bearing piles for the United States Engineer office, Los Angeles.

Seattle—Shape awards continue to lead other steel items, and volume of pending work is also expanding. Contracts were recently signed awarding Isaacson Iron Works, Seattle, 7550 tons for the Ballard



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Thomas Spacing Machine Co.
PITTSBURGH, PA.

Shape Awards Compared

	Tons
Week ended June 10	22,416
Week ended June 3	48,113
Week ended May 27	*13,424
This week, 1938	25,200
Weekly average, year, 1938	21,566
Weekly average, 1939	24,302
Weekly average, May	23,691
Total to date, 1938	362,762
Total to date, 1939	*534,637

*Revised.

Includes awards of 100 tons or more.

bridge project, Seattle. Washington state is revising plans and will call new bids in the near future for the Lewis river bridge requiring about 1500 tons.

Shape Contracts Placed

4300 tons, civic auditorium, Buffalo, to Bethlehem Steel Co., Bethlehem, Pa.

2400 tons, viaduct over Rock Island tracks, Blue Island, Ill., to Bethlehem Steel Co., Bethlehem, Pa.

2000 tons, main cableway tower, Shasta dam, Calif., to Columbia Steel Co., San Francisco.

1700 tons, bearing piles, United States engineer office, Los Angeles, to Columbia Steel Co., San Francisco.

1550 tons, Ballard bridge, Seattle, to Isaacson Iron Works, Seattle; previously reported as 3049 tons.

900 tons, new driveaway building, Ford Motor Co., Dearborn, Mich., to Whitehead & Kales Co., Detroit.

850 tons, East river drive, Fifty-fourth to Sixty-fourth streets, New York, to American Bridge Co., Pittsburgh; through Poirier & McLane Corp., New York.

810 tons, state bridge, Mazonia, Ill., to Bethlehem Steel Co., Bethlehem, Pa.

695 tons, commissary building, Horn & Hardart Co., Philadelphia, to Belmont Iron Works, Philadelphia.

650 tons, factory building, for Great Lakes Coal & Coke Co., Niagara Falls, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

480 tons, Commodore Perry housing project, to Bethlehem Steel Co., Buffalo.

440 tons, state bridge, Akron, O., to Burger Iron Co., Akron, O.

425 tons, building for General Foods, San Francisco, to Judson-Pacific Co., San Francisco.

350 tons, Hood River, Oreg., lift span, to Poole & McGonigle, Portland; Gilpin Construction Co., Portland, general contractor.

310 tons, building, Hanes Hosiery Mills, Winston-Salem, N. C., to Carolina Steel & Iron Co., Greensboro, N. C.

300 tons, alterations to main building, Battelle institute, Columbus, O., to American Bridge Co., Pittsburgh.

300 tons, bridge FAP-1031-A, Kaufman county, Texas, to Mosher Steel Co., Dallas.

290 tons, trusses and lintels, Glenwood housing project, Philadelphia, to Roy A. Robinson, Philadelphia.

275 tons, building, for Eddy Paper Co., Manitowoc, Wis., to unknown fabricator.

270 tons, bridge FAP-140-O, Williamson county, Texas, to Masher Steel Co., Dallas.

250 tons, Shore parkway grade separation, Brooklyn, N. Y., contract MS-39-12, to American Bridge Co., Pittsburgh; through Johnson, Drake & Piper Co., New York.

240 tons, central heating plant, Rantoul, Ill., for United States government, to unknown fabricator.

235 tons, subway, second section, Chicago, to American Bridge Co., Pittsburgh.

233 tons, board plant, for U. S. Gypsum Co., New Brighton, N. Y., to Fort Pitt Bridge Works, Pittsburgh.

230 tons, state highway bridge, Denver, to Kansas City Structural Steel Co., Kansas City, Kans.

220 tons, grade school and gymnasium, Barberton, O., to Berger Iron Works, Canton, O.

200 tons, plate girder bridge, Westfield river, Cummington, Mass., to Phoenix Bridge Co., Phoenixville, Pa.; Casper-Ranger Construction Co., Holyoke, Mass., general contractor.

185 tons, E. I. du Pont de Nemours & Co., Wilmington, Del., reinforcing floors in Philadelphia building, to Belmont Iron Works, Philadelphia.

180 tons, alterations and additions to assembly building, Norwood, O., for Chevrolet Motor Co., to Taylor & Gaskin Inc.

180 tons, church building, Newark, N. J., for Our Lady of Good Counsel church, to Bethlehem Steel Co., Bethlehem, Pa.

175 tons, beam-span bridge, Northumberland, N. H., to American Bridge Co., Pittsburgh.

170 tons, building, International Harvester Co., Harrisburg, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

170 tons, store building, for S. S. Kresge Co., Wilmington, Del., to Belmont Iron Works, Eddystone, Pa.

167 tons, three I-beam bridges, two 74-foot and one 84-foot, Wilmington, Vt., to Bethlehem Steel Co., Bethlehem, Pa.; Rome Construction Co., Holden, Mass., general contractor.

160 tons, government fish hatchery, Leavenworth, Wash., to American Bridge Co., Pittsburgh.

155 tons, bridge, Pennsylvania railroad, Rockville and Enola yard, Pennsylvania, to American Bridge Co., Pittsburgh.

145 tons, shipyard shop, Electric Boat Co., Groton, Conn., to Bethlehem Fabricators Inc., Bethlehem, Pa.

143 tons, underpass, specification 1209-D, Central Valley project, Calif., to Bethlehem Steel Co., Bethlehem, Pa.

140 tons, state bridge, Mazonia, Ill., to Midland Structural Steel Co., Cicero, Ill.

135 tons, state bridge 1774, Aboite, Ind., to Pan-American Bridge Co., New Castle, Ind.

130 tons, state bridge, Lake Leelanau, Mich., to Wisconsin Bridge & Iron Co., Milwaukee.

128 tons, I-beam bridges, Bridgewater and Goshen, Vt., to Bethlehem Steel Co., Bethlehem, Pa.; Ryan & Densmore, Claremont, Vt., general contractors.

125 tons, bridge, route 11, Wyoming county, Pennsylvania, to American Bridge Co., Pittsburgh.

125 tons, manufacturing plant, for Gelatin Products Co., Detroit, to R. C. Mahon Co., Detroit.

120 tons, machine and storage building, Scott Paper Co., Chester, Pa., to Bethlehem Fabricators Inc., Bethlehem, Pa.

115 tons, bridge over Ottawa river, Lima, O., for Detroit, Toledo & Ironton railroad, to American Bridge Co., Pittsburgh.

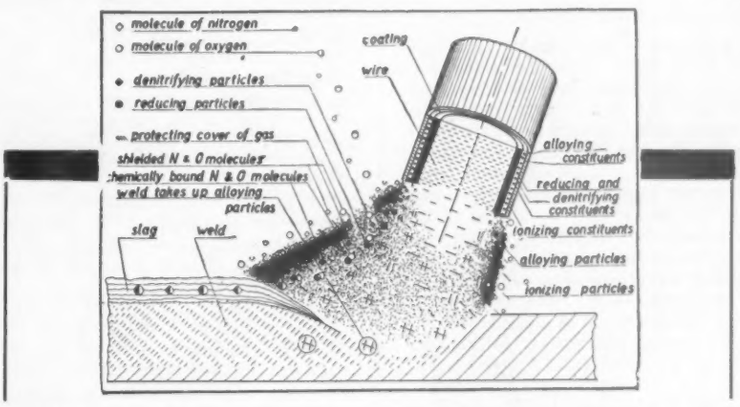
115 tons, bridge, section 110V-F, Agnew, Whiteside county, Illinois, to American Bridge Co., Pittsburgh.

100 tons, Washington state bridge at Brewster, to Isaacson Iron Works, Seattle.

Shape Contracts Pending

6000 tons, 11 drum gates, Grand Coulee dam, specification 854, Washington; bids July 12.

All those interested in the alloying process of electrodes, stop and study this sketch



AGILE ELECTRODES bear examination at any time, but the above diagram is particularly interesting because it shows the fusing process of the arc. You can see, for example, how the coating breaks down and adds to the weld metal all the necessary elements in their required amounts. This special coating gives maximum protection, as it is deposited, against the gases in the atmosphere. AGILE ELECTRODES permit fast, foolproof welding, and are the PERFECT RODS FOR WELDING WITH A. C. TRANSFORMERS. To acquaint you with their properties, samples will be sent free. Write to

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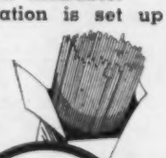

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DETROIT, MICH.

2100 tons, work at Grand Coulee dam, Wash.; bids opened.

2000 tons, contract S-3, State street subway, Chicago; bids June 29.

1100 tons, Plum beach channel bridge, superstructure, Brooklyn; Mill Basin Asphalt Co., New York, low.

1050 tons, bridges, Oswego, Allegheny and Hamilton counties, New York; bids June 21.

1000 tons, Central high school, Cleveland; bids July 6.

900 tons, public school 31, New York, for board of education.

850 tons, steel roof framing, Grand Coulee dam power plant, Washington; Columbia Steel Co., San Francisco, low.

795 tons, Raccoon creek bridge, Bridgeport, N. J., involving vertical lift span with open grating floor and four approach spans; F. A. Canuso & Co., Philadelphia, low; bids June 2.

750 tons, warehouse, Armstrong Cork Co., Lancaster, Pa., Hughes Foulkrod Co., Philadelphia, general contractor.

600 tons, grade separation, Elizabeth street, Hagerstown, Md., for state.

500 tons, grade separation project, Cloquet, Minn.; bids June 23.

450 tons, bridge over Snoqualmie river, Everett, Wash.

350 tons, Warland bridge, bid 284, Warland, Mont., for United States forest service.

350 tons, YMCA, Wilmington, Del.

350 tons, signal bridges, various locations, for Chicago, Rock Island & Pacific railway.

330 tons, music building, Fredonia, N. Y., for state.

310 tons, state bridges, Milwaukee.

300 tons, Howell school, Cleveland; bids June 23.

250 tons, apartment building, Winfield, Pa., Drexel Hill Construction Co., Drexel Hill, Pa., general contractor.

220 tons, repairs to track elevation, Chicago, for Chicago, Milwaukee, St. Paul & Pacific railroad.

200 tons, Baltimore & Ohio railroad, grade crossing elimination, Buffalo; bids June 19.

219 tons, three-span plate girder bridge, overall length 286 feet 8 inches, Weathersfield, Vt.; Edward L. Knight, South Royalton, Vt., contractor, $72,064.64; bids June 2.

215 tons, viaduct, Fleetwood, N. Y., for Westchester county park commission.

175 tons, storage and shipping building 38, for E. I. du Pont de Nemours, Philadelphia.

175 tons, plant extensions, for Spender Kellogg & Sons, Decatur, Ill.

170 tons, infirmary building, for Vassar college, Poughkeepsie, N. Y.

161 tons, underpass, route 4, section 40, Gordon's Corner, Malapan township, Monmouth county, New Jersey; bids June 23, E. Donald Sterner, state highway commissioner, Trenton; work includes two steel beam spans, total length 120 feet; also 47 tons reinforcing steel.

160 tons, bridge, route 4, sec. 40, New Jersey state highway; bids June 23.

150 tons, factory, Spencer Kellogg & Sons, Decatur, Ill.

150 tons, store, Beck Shoe Co., Philadelphia; bids June 13.

150 tons, pipe line support, for Proximity Mfg. Co., Greensboro, N. C.

135 tons, Kelley bridge, Newburg, Me.; bids June 21, Augusta, Me.

125 tons, store building, for Montgomery Ward & Co., New London, Conn.

125 tons, bridge over Canyon creek, Yegan, Mont., for Northern Pacific railway.

125 tons, state bridge 1535, Kanawha county, West Virginia.

120 tons, showroom and commercial building, for Brooklyn Edison Co., Brooklyn, N. Y.

120 tons, bridge, Wheeling, W. Va., for Wheeling & Lake Erie railway.

115 tons, factory building, for Bushwick Iron & Steel Co., Brooklyn, N. Y.

110 tons, bowling alley, for B. & J. Realty Co., Columbus, O.

105 tons, warehouse, for Thatcher Mfg. Co., Elmira, N. Y.

100 tons, silk factory, Scholler Bros., Philadelphia; bids June 15.

Unstated tonnage, miscellaneous items, steel doors, etc., untanking, oil purifying and other buildings, North Vancouver, Wash.; bids to Bonneville authority, Portland, June 15.

Reinforcing

Reinforcing Bar Prices, Page 85

Pittsburgh — Price situation is somewhat firmer, although there is still a nervous tone which indicates possible further weakness. Inquiries are lighter, however, a good tonnage is pending. There is a large tonnage of government work due to come out for bids shortly. Awards are lighter with only a few scattered jobs involving more than 100 tons placed.

Cleveland — Most fabricators are operating at low levels. A number of school jobs and state grade crossings should bolster backlogs. Hunkin-Conkey Construction Co., Cleveland, is low on general contract for Luna park housing project, here, involving 1050 tons. Prices have failed to stiffen.

Chicago — Demand is unchanged with no substantial new inquiries out or large awards placed. Largest pending job involves 3350 tons for section S-3 of the Chicago subway, bids June 29. In addition approximately 3000 tons are actively pending for schools, garages, grain elevators, housing projects, and miscellaneous building constructions.

Philadelphia—Smaller fabricating shops are still fairly busy on old or-

Concrete Bars Compared

	Tons
Week ended June 10	**8,009**
Week ended June 3	**7,395**
Week ended May 27	**10,485**
This week, 1938	**4,990**
Weekly average, year, 1938	**6,959**
Weekly average, 1939	**10,802**
Weekly average, May	**9,743**
Total to date, 1938	**130,311**
Total to date, 1939	**237,638**

Includes awards of 100 tons or more.

ders, but backlogs are shrinking. Prices continue weak with jobs going recently as much as $13 a ton under published levels.

St. Louis—Awards total about 350 tons, the largest single letting was 200 tons to Laclede Steel Co. for a building at the University of Illinois, at Urbana. A number of small projects are pending which should be awarded before the end of this month.

San Francisco—Inquiries are limited to lots less than 100 tons. However, pending business exceeds 9000 tons. Awards totaled 1399 tons, bringing the aggregate to date to 78,425 tons, compared wtih 44,092 tons last year. Consolidated Steel Corp. took 500 tons for the Allan Hancock Foundation building for the University of Southern California, Los Angeles.

Seattle—Awards of less than 100 tons are more active and several sizable jobs are pending involving in excess of 1500 tons, including 750 tons for the Ballard bridge, Seattle.

Reinforcing Steel Awards

1650 tons, flood control project, Connecticut river, Hartford, to Bethlehem Steel Co., Bethlehem, Pa.; through F. H. McGraw & Co., Hartford, tonnage includes piling.

1275 tons, Commodore Perry housing project, to Truscon Steel Co., Buffalo.

950 tons, Mill basin bridge, MS-39-3B, Brooklyn, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

700 tons, plant and grain elevators for Centennial Mill Co., Spokane, to Northwest Steel Rolling Mills, Seattle; Austin Co. and Alloway & Georg, Spokane, general contractors.

600 tons, Laurel hill tunnel, Pennsylvania turnpike commission, to Truscon Steel Co., Youngstown, O.; Hunkin-Conkey Co., Cleveland, contractor.

600 tonsfl outfall sewer, Bolling field, Washington, to Bethlehem Steel Co., Bethlehem, Pa.; Diamond Construction Co., contractors.

500 tons, Allan Hancock Foundation building, University of Southern California, Los Angeles, to Consolidated Steel Corp., Los Angeles.

346 tons, underpass, Phoenix, Ariz., to unnamed interest.

200 tons, warehouse, Lansburg Bros., Washington, to Jones & Laughlin Steel Corp., Pittsburgh; through Rosslyn Steel & Cement Co.

200 tons, veterans' administration building, Salt Lake City, Utah; to unnamed interest; general contract to J. S. Metzger & Son, Los Angeles, at $180,000.

200 tons, natural resources building, University of Illinois, Champaign-Urbana, Ill., to Joseph T. Ryerson & Son Inc., Chicago.

200 tons, for students union building, University of Illinois, Urbana, Ill., to Laclede Steel Co., St. Louis; through English Bros., Champaign, Ill.

150 tons, junior-senior high school, East Greenbush, N. Y., to Strope Steel Co., Albany, N. Y.

125 tons, freight house, New York Central railroad, New York, to Wickwire-Spencer Steel Co., New York; through James Stewart & Co., New York.

113 tons, bridge, Los Angeles county, California, for state, to unnamed interest.

100 tons, theater, Lido Isle, Orange county, California; to unnamed interest.

100 tons, Washington state highway work, to Northwest Steel Rolling Mills, Seattle.

Reinforcing Steel Pending

3353 tons, contract S-3, State street subway, Chicago; bids June 29.

1200 tons, channel improvement, Canisteo river, Hornell, N. Y.; bids to army engineers, Binghamton, N. Y.

1050 tons, Luna park housing project, Cleveland; Hunkin-Conkey Construction Co., Cleveland, low.

500 tons, underpass, Louisville, Ky.

380 tons, federal building and postoffice, Anchorage, Alaska; McCarthy Bros. Construction Co., St. Louis, general contractor.

350 tons, gun battalion barracks, Hickam Field, T. H.; bids opened.

240 tons, section 11-B, Pennsylvania turnpike, Bedford county, Pennsylvania.

190 tons, soy bean elevator, Decatur, Ill.

176 tons, road construction, FA-33, Raymond-Epping, N. H.

175 tons, bars and mesh, Raccoon creek bridge, and by-pass, Bridgeport, N. J.; F. A. Canuso & Co., Philadelphia, low; bids June 2.

130 tons, Coca-Cola plant, Seattle; Teufel & Carlson, Seattle, general contractors.

100 tons, section 16-B, Pennsylvania turnpike, Fulton county, Pennsylvania.

100 tons, sewage disposal plant, Cortland, N. Y.

Unstated tonnage, footings for transmission tower line; bids to Bonneville authority, Portland, June 15.

Pig Iron

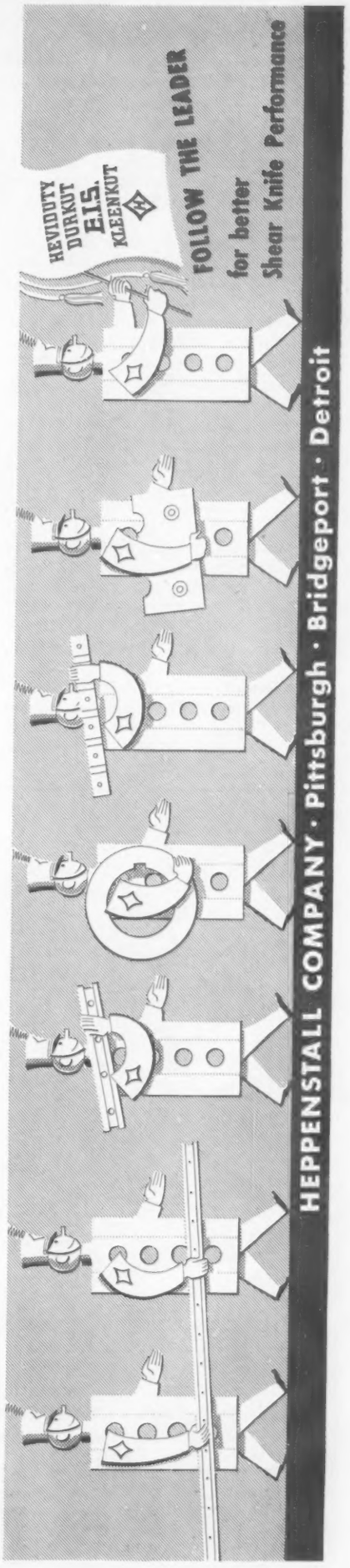
Pig Iron Prices, Page 86

Cleveland — Releases so far this month vary only slightly from May. In some instances shipments are heavier, but no definite upturn is looked for before July. Production of automotive castings will start to be influenced by new model work next month. Pig iron buying is almost entirely in small lots for prompt shipment.

Chicago—Shipments are off 5 to 10 per cent from May. Downtrend in foundry melt is believed imminent. Some foundries have maintained operations quite well, but a number report a tapering. A small amount of spot buying is going on, with no forward purchasing evident. By-product foundry coke shipments are about 25 per cent behind last month, but this was expected because of stocking done during the coal strike.

New York — Most leading sellers have opened third quarter books at unchanged prices, and some orders have been entered for that period. However, buying generally is hand-to-mouth. Shipments are practically unchanged since a month ago.

Philadelphia—Pig iron buying con-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tinues hand-to-mouth, and in few instances are consumer inventories of any size. Jobbing foundries are doing well since a number of manufacturers have closed down foundry divisions the past few years. A Johnstown, Pa. interest recently bought about 550 tons of foundry iron at the auction of inventory of the Riddlesburg, Pa. furnace held by the Reconstruction Finance Corp. The price was about $17.50 f.o.b., equivalent to $21.50, Philadelphia. Pig iron stocks of foundries in the Philadelphia Federal Reserve district were 2440 tons as of May 1, reductions of 4.9 per cent from a month ago and 22.4 per cent from a year ago. April production of gray iron castings was 3598 tons, a decline of 11 per cent from March, but an increase of 11.8 per cent over April, 1938. Unfilled orders increased slightly.

Buffalo — Pig iron shipments are fairly steady, with buyers showing little interest in forward coverage. Blast furnace operations have risen to 57 per cent, lighting of a Republic stack giving the district eight active furnaces out of 14.

Cincinnati — Shipments indicate little change in the melt, except for a tapering in output of stove castings. Demand from machine tool interests is well sustained. Jobbing foundries are without backlogs. Southern iron producers have delayed formal announcement of third quarter prices, but melters are not concerned with covering future needs.

St. Louis—Iron deliveries so far this month have extended the sharp slump prevailing in May. Reduction in the melt is most pronounced among farm implement and stove plants. Makers of heating equipment, however, are more active. Little new business has appeared in pig iron.

Toronto, Ont.—Small melters are furnishing most new business, the total being about 1800 tons for the week. Minor reductions in prices at lake ports now are in effect, and some iron now is moving over water routes. Production in May was 18 per cent over April. Four out of five furnaces are active, a gain of one recently.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 85

Some bolt and nut producers have delayed announcement of third quarter prices, although the temporary reduction during June to distributors is being met. Demand is fairly steady, including occasional small lots for 1940 automobile model requirements. Railroad orders for car building and repair work are slightly heavier in some districts.

Scrap

Scrap Prices, Page 88

Pittsburgh—Scrap prices generally are higher, headed by a $1 increase in No. 1 steel on a mill purchase at more than $15. Dealers are reported asking up to $16 for this grade but with no takers yet. Railroad specialties are in good demand, with prices $1 higher since closing on last lists.

Cleveland — Scrap has gained strength recently, as supplies are limited and some railroad offerings have been earmarked for export. An important consumer at Lorain, O., has covered a tonnage of cast borings at about $8.50. A Cleveland consumer has placed some heavy melting steel at about $14.25 for No. 1. Strikes at Detroit dried up that source temporarily.

Chicago—Three local mills have bought scrap lately, resulting in general price advances. No. 1 heavy melting steel moved up $1 to $13.50 to $14 on sales of substantial tonnages at both figures. Auto heavy melting is up similarly to $12.25 to $12.75. Prices bid on railroad lists testify to strength of the market.

Boston — Export movement is heavy and heavy melting steel is firm and unchanged. This is strengthening domestic prices but business is light. Demand for small lots of textile and other cast grades is spotty.

New York — Considerable export scrap has accumulated awaiting cargo space, and brokers have curtailed buying until this tonnage clears. Cast grades are easier as a result. Domestic demand from steelworks and foundries is slack, with prices somewhat softer.

Buffalo—Scrap has a better undertone, but mills still have orders outstanding and no new business of consequence has appeared in three weeks. Shipments against old contracts have been retarded recently. No. 1 steel continues $13 to $13.50.

Philadelphia—District mills have purchased several thousand tons of No. 1 heavy melting steel at $15.50, thus eliminating the lower side of the recent range of $15 to $15.50. Business also has been done in several other grades in moderate volume, including No. 2 steel in the range of $13 to $13.50, stove plate and grate bars at $13, heavy cast at $14.75 and old compressed sheets at $12. Foundry grades are dull and

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HOTEL CLEVELAND *Cleveland*

practically unchanged. Export buying is active with some difficulty in obtaining desired tonnage. No. 1 steel readily brings $15.25 f.a.s. Port Richmond and No. 2, $13.75. Some is being picked up at 25 cents less.

Detroit—Sentiment among dealers is bullish despite restricted buying. Prospects for improvement in steelmaking so far have not been reflected in prices. Closing shortly on automobile lists will give the first test to current quotations.

Cincinnati—Dealers are more optimistic and are holding heavier scrap grades, although the market continues slow. Scrap shipments are maintained but coverage has not caused active bidding. Material is coming out slowly at present prices.

St. Louis — Scrap is quiet, sales and inquiries being scarce. Except for a 25 cent reduction in heavy melting steel prices are unchanged. Scant offerings provide a firm undertone. Yard stocks also are moderate.

Birmingham, Ala.—No activity is reported in the scrap market, which for weeks has been unusually quiet.

Seattle — Exporting houses are booking small orders for shipment to Japan, under that country's monthly allotment budget. However, the total is comparatively small. Export prices, unchanged at $14 to $14.50, are steadied by small stocks at tidewater. Rolling mills are filling needs at $11 and $12, this section of the market being somewhat easier.

Toronto, Ont.—Prices are unchanged except for a 50-cent reduction in stove plate. Mills are taking shipments against orders and have closed new contracts for about a month ahead. No. 2 steel is plentiful but No. 1 is scarce. Supplies of machinery cast are in excess of foundry demand.

Warehouse

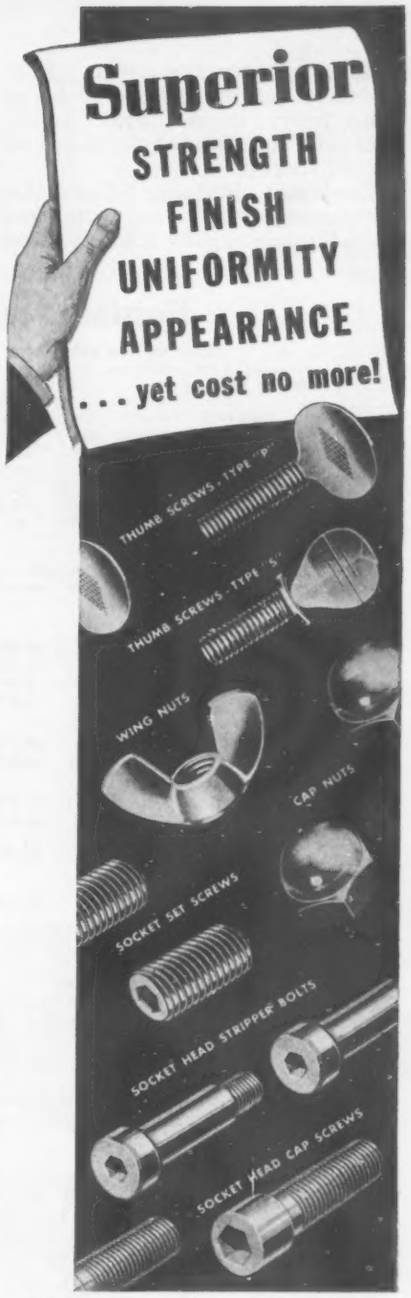
Warehouse Prices, Page 87

Cleveland—Sales so far in June are changed but slightly from last month. Occasional gains in some directions are offset by seasonal slackening in demand elsewhere. Prices generally are steady.

Chicago — Business has increased slightly so far this month, and a small increase for June as a whole is thought not unlikely. Bars, small shapes, sheets and strip are most active.

Buffalo—Business is at about the May rate which was relatively low. Prices again are fairly stable. Quiet in heavy products is restricting total demand.

Philadelphia—Volume so far this



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month is under May, with lighter products moving relatively better than heavy items. Price adjustments on cold finished sheets are expected shortly.

Cincinnati—Business holds at the satisfactory May level, with individual orders slightly heavier. Prices are stronger following recent adjustments.

St. Louis—Sales hold around the level of late May. Building items and oil country supplies remain fairly active, but miscellaneous needs have not expanded. Steadier prices are in prospect.

Nonferrous Metal Prices

Spot unless otherwise specified. Cents per pound.

June	Copper Electro, del. Conn.	Copper Lake, del. Midwest	Copper Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
3	10.00	10.00	9.62½	49.00	48.62½	4.75	4.60	4.50	20.00	12.00	35.00
5	10.00	10.00	9.62½	48.90	48.55	4.75	4.60	4.50	20.00	12.00	35.00
6	10.00	10.00	9.62½	48.75	48.40	4.75	4.60	4.50	20.00	12.00	35.00
7	10.00	10.00	9.62½	48.75	48.40	4.75	4.60	4.50	20.00	12.00	35.00
8	10.00	10.00	9.62½	48.65	48.35	4.75	4.60	4.50	20.00	12.00	35.00
9	10.00	10.00	9.62½	48.40	48.10	4.75	4.60	4.50	20.00	12.00	35.00

MILL PRODUCTS

F.o.b. mill base, cents per lb., except as specified. Copper brass products based on 10.00c Conn. copper

Sheets

Yellow brass (high) 16.48
Copper, hot rolled 18.12
Lead, cut to jobbers 8.00
Zinc, 100 lb. base 9.75

Tubes

High yellow brass 19.23
Seamless copper 18.62

Rods

High yellow brass 11.85
Copper, hot rolled 14.62

Anodes

Copper, untrimmed 15.37

Wire

Yellow brass (high) 16.73

OLD METALS

Nom. Del. Buying Prices

No. 1 Composition Red Brass

New York 5.75-6.00
Cleveland 6.50-6.75
Chicago 5.75-6.00
St. Louis 6.00-6.25

Heavy Copper and Wire

New York, No. 1 ..... 7.75-7.87½
Cleveland, No. 1 ..... 7.50-7.75
Chicago, No. 1 ..... 7.37½-7.62½
St. Louis 7.50-7.75

Composition Brass Borings

New York 5.00-5.25

Light Copper

New York 6.25-6.50
Cleveland 5.75-6.00
Chicago 5.75-6.00
St. Louis 6.00-6.25

Light Brass

Cleveland 3.50-3.75
Chicago 3.87½-4.12½
St. Louis 3.50-3.75

Lead

New York 4.00-4.25
Cleveland 3.50-3.75
Chicago 3.50-3.75
St. Louis 3.50-3.75

Zinc

New York 2.50-2.62½
Cleveland 2.00-2.25
St. Louis 2.25-2.50

Aluminum

Borings, Cleveland 5.75-6.00
Mixed, cast, Cleveland 7.75-8.00
Clips, soft, Cleveland 13.75-14.00
Misc. cast, St. Louis 7.00-7.25

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Standard No. 12 aluminum 12.00-12.25

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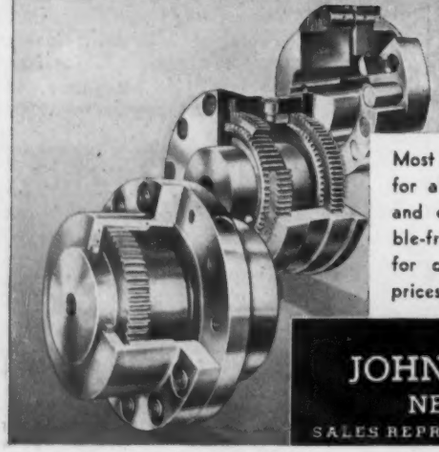

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Seattle — Business gains last month were due in some measure to instability of prices. This situation continues. Portland warehouses generally are maintaining prices above the Seattle market.

Steel in Europe

Foreign Steel Prices, Page 87

London—(*By Cable*)—Steelworks in Great Britain are producing at capacity, resulting in considerable increase in basic steel and pig iron production. The new supply ministry probably will have power to requisition production against normal commercial contracts. Foundry pig iron demand has improved slightly but hematite iron is dull. Prices of sheets, galvanized sheets and wrought iron have been stabilized at present levels to the end of October. Shipbuilders are placing orders for steel.

The Continent reports export trade slightly quieter and speculative buying is diminishing. The underlying market tone is regarded as satisfactory.

Nonferrous Metals

New York — Optimism increased last week in nonferrous metal markets as sales and shipments rose above expectations. Consumption has improved rather than tapered as had been expected.

Copper—Daily turnover in the primary market averaged over 2000 tons, reflecting a five point rise so far this month in brass mill operations to about 60 per cent of capacity. Bare and weatherproof copper wire eased ¼ to ½-cent per pound due to keen competition for business, although electrolytic held steady at 10.00c, Connecticut. Export copper eased to 10.05c, c.i.f. European ports, before rising to 10.15c.

Lead—Sellers were generally able to dispose of their daily intakes at the firm price of 4.60c, East St. Louis.

Zinc—Despite a decline in galvanized sheet output to 51 per cent of capacity, fresh demand maintained a weekly rate of around 4500 tons. Prime western held at 4.50c, East St. Louis.

Tin — Prices eased fractionally to around 48.40c for Straits spot since many observers expect the International Tin committee to increase quotas for the third quarter at Wednesday's meeting. Supplies of Straits appear tighter.

Ferroalloys

Ferroalloy Prices, Page 86

New York — Opening of third quarter books on ferromanganese is expected this week at unchanged

prices, with similar action thought likely on other leading ferroalloys. Some improvement in ferromanganese and spiegeleisen shipments this month is indicated by the upturn in steelmaking.

Ore Imports Heavy

Philadelphia — Shipments received during the week ending June 3 included 1000 tons of chrome ore from South Africa, 555 tons of pig iron from British India, 122 tons of structural shapes from Belgium, 49 tons of steel tubes, 32 tons of steel bands, six tons of steel bars, three tons of wire rods and one ton of granular iron, all from Sweden.

Equipment

Cleveland — Machine tool orders and inquiries are fair but spotty, continuing near the April and May levels. Increase in automotive buying is expected to follow settlement of the Briggs strike which held up some tool and die work. Aircraft buying continues active, and is viewed by toolmakers as an increasingly important outlet. District builders are sharing in some important government awards.

Chicago—Little change is reported in machinery business. Small orders have increased somewhat, but heavy ones are almost totally lacking. Inquiries are well maintained, indicating active interest in early purchases by a broad range of manufacturing and industrial interests.

Seattle — Electrical equipment, road machinery, pumps and treatment plant items are in best demand. The marine field is rather active but lumber and logging concerns are making only limited replacements. Tacoma has opened bids for 27½ tons copper wire, $11,000 available. Roseburg, Oreg., will open bids June 19 for treatment plant equipment.

Construction and Enterprise

Ohio

CLEVELAND—City, Frank O. Wallene, director of utilities department, is taking bids due at noon, June 16, on fuel car moving equipment and other items for its generating plant at East Fifty-third street. Consulting engineer, Peter Loftus, Pittsburgh.

COLUMBUS, O.—Quality Fixture Co. has plans completed and will take bids in the next 60 days for a two-story, 35 x 150-foot plant costing $40,000. J. E. Outcalt, Columbus, consulting engineer.

DAYTON, O.—Univis Lens Corp. proposes to build a four-story factory costing more than $40,000. Project will mature soon. Geyer & Neuffer, Dayton, architects.

DAYTON, O.—Dayton Power & Light Co. has plans for a power plant expansion program to cost $4,000,000 over the next two years. Involves a 40,000-horsepower hydrogen-cooled turbine, two water tube boilers, and a 66-kilovolt ampere substation.

LIMA, O.—Ohio Steel Foundry Co. soon will let contracts for a one-story, 187 x 222-foot steel foundry costing $150,000. Albert Kahn Inc., Detroit, engineer.

RAWSON, O.—Village, J. C. Romick, mayor, has approved bond issue and received WPA allotment for a waterworks costing an estimated $60,000. Will take bids soon. Project involves elevated tank, pumping and distributing systems. Russell Mason, Findlay, O., consultant.

SHELBY, O.—City, D. B. Young, mayor, is completing its plans and will be ready for bids about June 20 on improvements to its electric light plant. Consulting engineers, Froehlich & Emery, Toledo, O. (Noted May 15.)

New York

BROOKLYN, N. Y.—Sherron Metallic Corp. has plans for altering its three-story factory at estimated cost of $50,000. Kolb & Miller, New York, architects.

NEW YORK—National Gypsum Co., Buffalo, is planning to build a one-story, 118 x 453-foot storehouse costing about $125,000. J. H. Anderson, Marion, Pa., consulting engineer.

NIAGARA FALLS, N. Y.—New York Power authority, Albany, N. Y., is making a survey for a complete 787,000-horsepower hydroelectric development costing over $50,000,000. G. V. Cruise, chief engineer, care of owner.

WATERLOO, N. Y.—Campbell-Vincent Co., R. Campbell, president, has purchased the old carbarns of Auburn Trolley Co., and will remodel and equip for manufacturing automobile bodies.

Pennsylvania

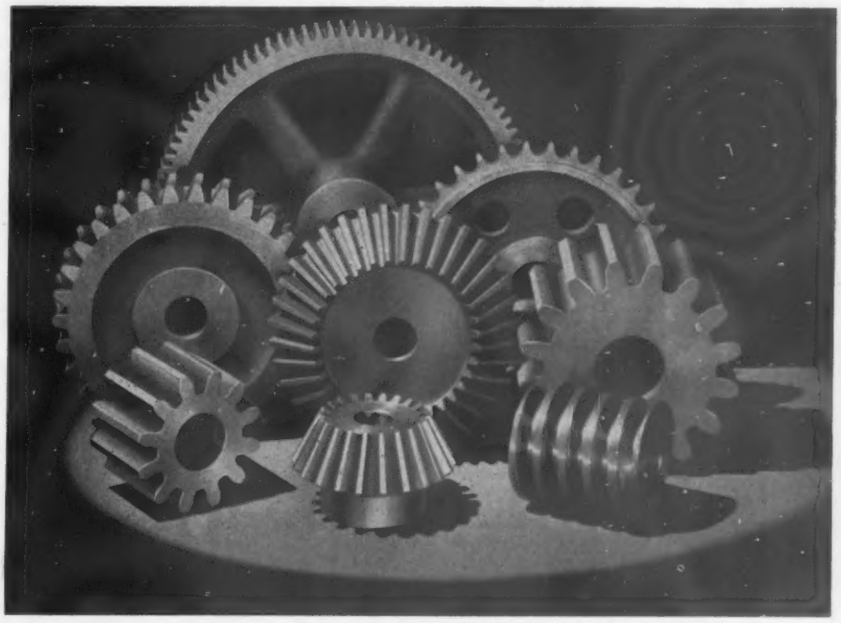
ERIE, PA.—City, Charles Barber, mayor, takes bids to 9 a. m., June 16, on a chlorination plant for treating sewage. Will comprise 18 chlorinating tanks and cost $18,000. City engineer, Alexander Aitken. (Noted May 22.)

SHARON, PA.—City, Fred Williams, clerk, takes bids due at 7:30 p. m., June 23, on contracts 8, 9, 10 and 11 on a sewage disposal plant. Included are ejector station, pump station, generator station and sewage gas engine-driven generators. Lewis Burnside, city engineer.

Illinois

SOUTH PEKIN, ILL.—Commonwealth Edison Co., Chicago, plans to build a 105,000-kilowatt generating plant, and a 220,000-volt transmission line to Chicago. Total cost estimated at about $25,000,000. Sargent & Lundy, Chicago, engineers.

SPRINGFIELD, ILL.—City, S. J. Sibley, superintendent of water, light and power, proposes to construct a power



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generating plant costing $500,000 at Lake Springfield.

WOOD RIVER, ILL.—Shell Union Oil Co., Roxana, Ind., has tentative plans underway for an oil refinery to cost with equipment more than $10,000,000.

WOODSTOCK, ILL.—Alemite Die Casting Co., Chicago, is drawing plans for a one-story, 90,000-square foot factory estimated to cost approximately $200,000.

Indiana

EVANSVILLE, IND.—Sunbeam Electric Co., J. H. Denny, vice president in charge of engineering, has plans in progress for a 55 x 200-foot, two-story factory addition costing $75,000. E. C. Berendes, Evansville, architect.

INDIANAPOLIS—Nu-Way Mfg. Corp., 531 Security Trust building, has been incorporated with 1000 shares no par capital stock to manufacture machinery.

VINCENNES, IND.—Knox County Rural Electric Membership Corp., E. B. Miller, president, has $200,000 REA allotment, and will erect 186 miles of rural electric power transmission lines.

Kentucky

MONTICELLO, KY.—South Kentucky Rural Electric Co-operative Corp., W. Dalton, president, has a $221,000 REA allotment and will erect 218 miles of rural power lines through four counties.

Georgia

MILLEDGEVILLE, GA.—City, L. F. Ham, clerk, has voted $33,000 bond issue to finance improvements in its waterworks costing about $87,000. Work is to begin in August.

North Carolina

TARBORO, N. C.—Edgecombe-Martin Electric Membership Corp. will expend $82,000 in constructing 100 additional miles of rural electric lines in three counties, and $60,000 for 50 miles in two counties.

South Carolina

COLUMBIA, S. C.—South Carolina Rural Electrification authority, J. T. Duckett, director, has $598,000 REA allotment, and will soon call for bids on 717 miles of rural electric lines in three counties.

Tennessee

CENTERVILLE, TENN.—Merriwether-Lewis co-operative, D. Bates, acting superintendent, has received a $392,000 loan from REA, and will build 280 miles of rural electric lines in four counties.

KNOXVILLE, TENN.—Tennessee Valley authority, C. H. Garity, director of purchases, takes bids to June 21 on hydraulic turbines and governors for units 3 and 4 of Wheeler power plant.

Louisiana

HOMER, LA.—Clairborne Electric Co-operative Inc., L. Almond, president, has been allotted $175,000 by REA and proposes to construct rural electric lines aggregating 231 miles in four parishes.

West Virginia

MARLINTON, W. VA.—Peerless Coal & Iron Corp., Charleston, W. Va., is revising specifications and receiving bids until June 20 for a mining plant. Rush Meadows, chief engineer.

WEIRTON HEIGHTS, W. VA.—City, Carl Frankovitch, solicitor, is planning to construct a water distribution unit costing more than $75,500. Norman Parsons, Hancock county engineer.

Missouri

AFFTON, MO.—Affton Sanitary Sewer district, W. C. Plumb, president, is receiving bids for a sewage disposal plant. George S. Russell, St. Louis, engineer. (Noted April 17.)

Minnesota

DULUTH—Elliott & Co., meat packers, have awarded contract to Bergstrom & Gustafson, Duluth, for a packing plant addition costing $150,000 with equipment. Henschien, Everds & Crombie, Chicago, engineers.

MADISON, MINN.—City, James Hayden, clerk, is receiving bids until 8 p.m., June 14, on power plant improvements including new coal and ash handling equipment, smoke stack, feed water heater and combustion controls. Perkins & McWayne, Sioux Falls, S. Dak., consultants.

ST. PAUL—Donaldson Co. Inc., manufacturer of air purifiers and auto accessories, has awarded contract to Madsen & Simpson, Minneapolis, for a 38 x 130-foot, one-story factory addition.

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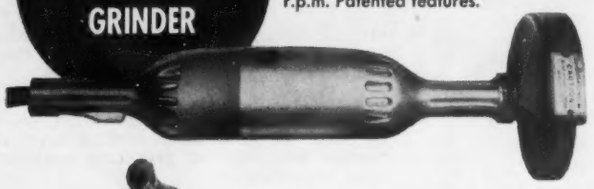

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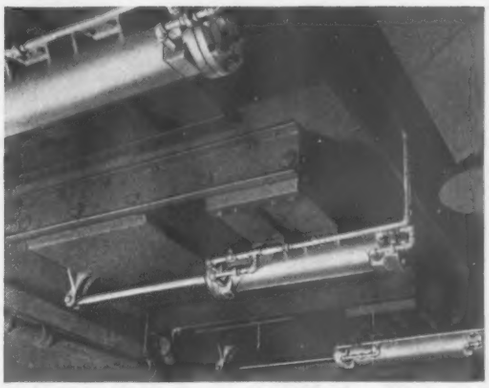

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Texas

BORGER, TEX.—Phillips Petroleum Co., Bartlesville, Okla., is enlarging its refinery here and installing additional equipment at cost of $750,000. S. Learned, Bartlesville, consulting engineer.

HEREFORD, TEX. — Smith County Electric Co-operative Inc. has plans in progress for 224 miles of rural electric transmitting lines in three counties at cost of $147,000. William G. Morrison, Dallas, Tex., engineer.

ORANGE, TEX. — Sabine Supply Co. takes bids in late summer on a 100 x 135-foot fireproof warehouse costing $50,000. W. E. Simpson Co., San Antonio, Tex., consulting engineer.

Kansas

KANSAS CITY, KANS.—Phillips Petroleum Co., Bartlesville, Okla., proposes to enlarge its oil refinery here with additional stills, lubricating oil equipment, tanks and pumps. Cost is estimated at $800,000. S. Learned, Bartlesville, engineer.

Nebraska

ALLIANCE, NEBR.—City, R. W. Laing, clerk, takes bids to 7:30 p.m., June 15, on one steam generator and auxiliaries to be installed in municipal electric plant. Certified check 5 per cent to accompany bid. Black & Veatch, Kansas City, Mo., consulting engineers.

GERING, NEBR.—City has applied to state railway commission for authority to erect proposed system of rural electric transmission lines.

HASTINGS, NEBR.—Nebraska Refining Co., M. H. Robineau, president, plans to build an oil refinery costing approximately $400,000 and requiring considerable equipment.

Iowa

CLINTON, IOWA—Clinton Co. proposes to construct a power house and install three steam generating units and other electrical equipment at total cost of $960,000. Project will mature this year.

DE WITT, IOWA—Franklin Engineering Co., maker of dishwashers for commercial use, has acquired a factory here, will remodel and equip it for manufacturing purposes.

KELLOGG, IOWA — Midwest Metal Stamping Co. has begun construction of a 60 x 265-foot, one-story factory addition costing about $60,000, for manufacturing washing machines.

LOVILLA, IOWA—Blackstone Coal Co. has begun construction of a coal processing plant and will install machinery and equipment for ten grades of coal. Capacity 1000 tons daily.

SIOUX CITY, IOWA—Tiller Foundries has been incorporated with $25,000 capital to operate a general foundry business. Egil T. Miller, president.

SIOUX CITY, IOWA—Woodbury Rural Electric co-operative, Dale Schreiner, project superintendent, has completed plans for another rural electric generating and transmission unit.

Colorado

FT. COLLINS, COLO.—City plans to install in its power plant a new turbogenerator, furnace and boiler unit costing $321,000 in all. Has applied for PWA funds.

LAMAR, COLO.—REA has allotted $533,000 to the Southeast Colorado Power association to finance projected rural electric power lines.

Nevada

WEEPAH, NEV.—Weepah Nevada Mining Co. plans to construct at cost of $40,000 a 250-ton cyanide mill. E. S. Schrader, Weepah, consulting engineer.

Pacific Coast

ROSEBURG, OREG.—City, A. J. Geddes, recorder, receives bids June 19 for mechanical equipment and appurtenances to be installed in proposed treatment plant.

Canada

WATERWAYS, ALTA.—Scientific Equipment Ltd., R. W. Roso, manager, Regina, Sask., is preparing plans for a plant to extract oil and other products from tar sand. Cost estimated at $100,000.

MONTREAL, QUE. — City executive commission has voted $500,000 for a pumping station with elevated pumps for Little St. Pierre River sewage system. J. A. Blanchard is public works director.

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READER Comments

Readers are invited to comment upon articles, editorials, reports, prices or other editorial material appearing in STEEL. The editors cannot publish unsigned communications, but at their discretion may permit a writer to use a pseudonym when a bona fide reason exists for withholding his identity. Letters should be brief—preferably not exceeding 250 words.

Institute Well Reported

To the Editor:

I would like to express my appreciation for the very excellent way in which your staff reported the recent general meeting of the Institute.

Your complete and accurate reporting of the sessions should have enabled those who were not present at the meeting to obtain a well-rounded picture of the proceedings.

WALTER S. TOWER

Executive Secretary,
American Iron and Steel Institute,
New York

Tydings Reprints Available

To the Editor:

In your June 5 issue you publish Senator Tydings' address before the American Iron and Steel institute.

This is a masterful address and the writer believes thousands of industries would like reprints for distribution among their workers and others who do not have opportunity of otherwise reading it.

If reprints will be available, quote us price per thousand.

B. G. COPE

President,
Will-Burt Co.,
Orrville, O.

Editor's Note—Reprints of Senator Tydings' address may be obtained from STEEL at 10 cents each for single copies or small lots; 5 cents each from 100 to 500; 4 cents for 500 to 1000; 3 cents over 1000.

"Every Worker Should Read"

To the Editor:

Please send me under personal cover 100 copies of the address of Senator Millard E. Tydings before the annual meeting of the American Iron and Steel institute, May 25.

Every worker in this country possessing enough intelligence to read and think should certainly read every word of this address.

C. I. SPROWL

President,
Mapes & Sprowl Steel Co.,
Newark, N. J.

"Remarkable Speech"

To the Editor:

Please send 100 reprints of Senator Tydings' address. May we congratulate STEEL on offering the opportunity to get copies of this remarkable speech.

U. SETH EBERHARDT

Vice President,
Newark Gear Cutting Machine Co.,
Newark, N. J.

"Very Interesting"

To the Editor:

Please send us ten copies of Senator Tydings' address before the annual meeting of the American Iron and Steel institute, contained in the June 5 issue of STEEL. This address was found to be very interesting.

J. R. H. NEAL

President,
Root, Neal & Co.,
Buffalo.

Export Figures Eloquent

To the Editor:

Frequent criticism of American exporters for alleged shortcomings in their methods of selling in foreign markets would seem to be poorly based, in view of the position they have assumed in world trade. Perhaps our salesmen have not learned to conform to buyers' habits in more leisurely countries but it would seem this possible handicap is more than overcome by excellence of what they have to sell.

In STEEL, June 12, page 30, the machinery division of the department of commerce reported sales of farm equipment totaling over $75,000,000 in 1938 and a practically equivalent volume in 1937. The report also stated that gains had been made in most markets in the later year, while losses in some other markets were the result of barter agreements, which are outside the channels of regular business.

On the same page was a report on industrial machinery exports in April, totaling over $24,000,000. These are in competition with the best products of European builders. Despite the alleged superiority of German and British metalworking equipment American manufacturers are selling steadily into both these countries, as well as in worldwide markets in which they compete.

One of the most important lines of machinery exports is power-driven metalworking equipment, machine tools, the machines that build other machines and probably the greatest civilizer among inanimate products. In this line American builders seem to have the lead in most markets, despite political considerations that have given Germany something of an advantage in some countries.

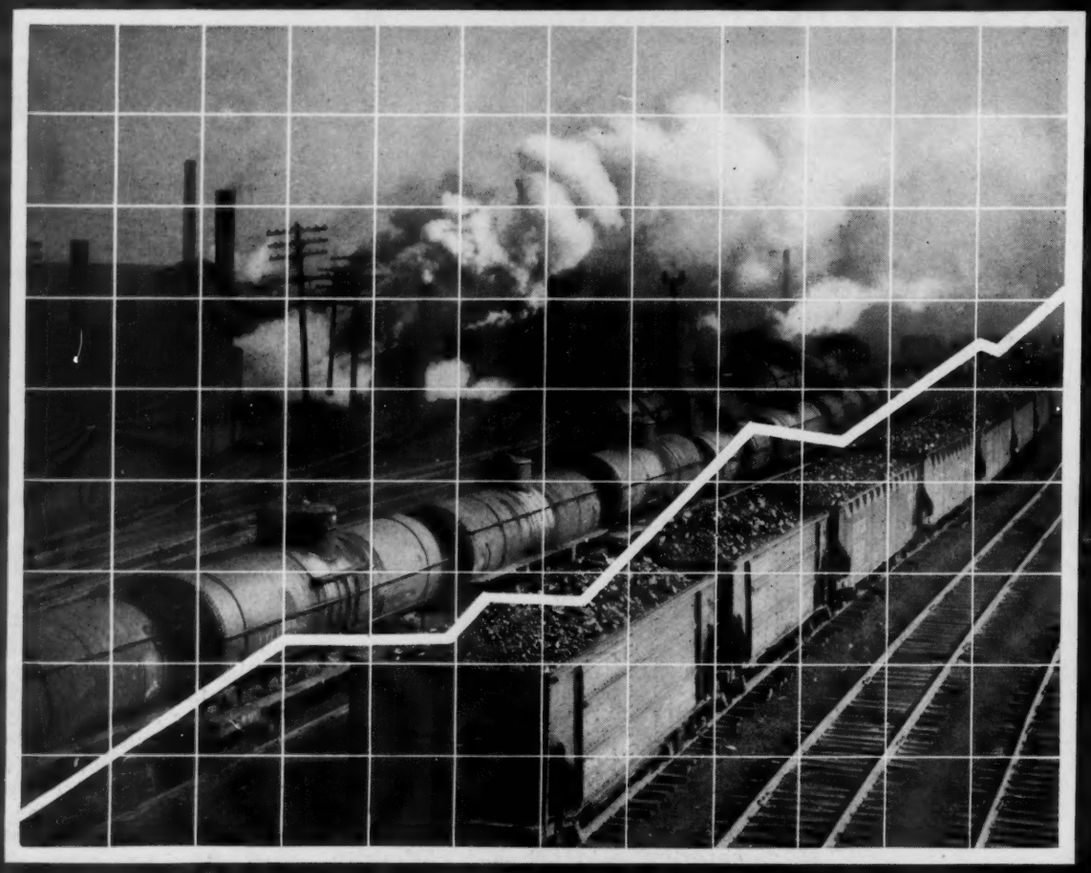
Tractor exports lead in the farm equipment field, developments giving superiority to American tractors doubtless running parallel with automotive progress in this country. American tractors seem to have the call over all others and form an important segment of foreign trade.

So, after all, the American salesman must have learned something about foreign selling. The figures prove it.

EXPORTER

New York

YOUR *FUEL BILLS* MAY BE GOING UP...



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This service, available to you without cost, can help you make important savings in your fuel bills. For full information, as well as details on the complete line of J-M Insulations, write Johns-Manville, 22 East 40th Street, New York, N. Y.

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